

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
<p>The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p> <p>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</p>					
1. REPORT DATE (DD-MM-YYYY) 18/Jan/2002		2. REPORT TYPE THESIS		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE THE JUNKYARD AIR FORCE: THE A26A NIMROD IN COMBAT OVER LAOS, 1966-1969				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) 2D LT HOADLEY DANIEL S				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) OHIO STATE UNIVERSITY				8. PERFORMING ORGANIZATION REPORT NUMBER CI02-10	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) THE DEPARTMENT OF THE AIR FORCE AFIT/CIA, BLDG 125 2950 P STREET WPAFB OH 45433				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Unlimited distribution In Accordance With AFI 35-205/AFIT Sup 1				DISTRIBUTION STATEMENT A: Approved for Public Release - Distribution Unlimited	
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
20020204 097					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES 79	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (Include area code)

**“THE JUNKYARD AIR FORCE”:
THE A-26A NIMROD IN COMBAT OVER LAOS, 1966-69**

By

Daniel S. Hoadley, M.A.

The Ohio State University, 2001

Professor John Guilmartin, Adviser

This study is a comprehensive history and analysis of A-26A operations during the Vietnam War. The A-26A was a highly effective special operations weapon system used for truck killing against the Ho Chi Minh Trail. The A-26A was at the center of a political debate in the Air Force between advocates of propeller driven aircraft for limited war roles and opponents who favored jets. My thesis is divided into three sections. The first section covers the A-26A's operational history, detailing the tactics, armament, and personalities that made them successful. The next section is an account of the political debate that raged over the A-26A. I discuss the motivations for opposition to propeller driven aircraft and the specific actions taken by opponents to hide and limit the Nimrod's success. The final section is an analysis of the A-26A using a qualitative framework in an attempt to correct flawed wartime reporting and evaluate the aircraft's tactical and strategic effectiveness. As the evaluation demonstrates, the A-26A was a highly successful weapon system that the Air Force failed to exploit.

VITA

April 3, 1978.....Born – Evanston, Illinois
2000.....B.S. Military History,
United States Air Force Academy
2000-present.....Officer, United States Air Force
Student, The Ohio State University

FIELDS OF STUDY

Major Field: Military History

BIBLIOGRAPHY

Primary Sources-

Unit Histories:

History of the 56th Air Commando Wing (ACW). File K-WG-56-HI, Apr-Jun 1967, Air Force Historical Research Agency (AFHRA), Maxwell Air Force Base (AFB).

History of the 56th ACW. File K-WG-56-HI, Jul-Sep 1967, AFHRA, Maxwell AFB.

History of the 56th ACW. File K-WG-56-HI, Oct-Dec 1967, AFHRA, Maxwell AFB.

History of the 56th ACW. File K-WG-56-HI, Jan-Mar 1968, AFHRA, Maxwell AFB.

History of the 56th ACW. File K-WG-56-HI, Apr-Jun 1968, AFHRA, Maxwell AFB.

History of the 56th Special Operations Wing (SOW). File K-WG-56-HI, Jul-Sep 1968, AFHRA, Maxwell AFB.

History of the 56th SOW. File K-WG-56-HI, Oct-Dec 1968, AFHRA, Maxwell AFB.

History of the 56th SOW. File K-WG-56-HI, Jan-Mar 1969, AFHRA, Maxwell AFB.

History of the 56th SOW. File K-WG-56-HI, Apr-Jun 1969, AFHRA, Maxwell AFB.

History of the 56th SOW. File K-WG-56-HI, Jul-Sep 1969, AFHRA, Maxwell AFB.

History of the 56th SOW. File K-WG-56-HI, Oct-Dec 1969, AFHRA, Maxwell AFB.

Oral Histories:

Aderholt, Harry C. Interview by Hugh N. Ahmann. USAF Oral History Interview, File K239.0512-1716, AFHRA, Maxwell AFB.

_____. Interview by Samuel E. Riddlebarger. USAF Oral History Interview, File K239.0512-249, 5 May 1970, AFHRA, Maxwell AFB.

Bonwit, B. L. USAF Oral History Interview, File K239.0512-064, Reel 1, AFHRA, Maxwell AFB.

Galuzzi, Jim. Interview by Author. April 12, 2001.

Gorski, Frank L. Interview by V. H. Gallacher and Lyn R. Officer. USAF Oral History Interview, File K239.0512-650, AFHRA, Maxwell AFB.

Kittinger, Joseph W. Interview by Robert B. Zimmerman. USAF Oral History Interview, File K 239.0512-807, AFHRA, Maxwell AFB.

_____. E-mail to Author. April 12, 2001.

Langford, Walter. E-mail to Author. April 12, 2001.

Marschalk, Paul. E-mail to Author. April 12, 2001.

Matthews, George. Interview by Author. April 11, 2001.

Schmidt, Nolan W. E-mail to Author. April 11, 2001.

Wickstrom, Tom. Interview by Author. March 30, 2001.

Official Reports/Manuals:

Aderholt, Harry C. *End of Tour Report, Commander 56th Air Commando Wing*. File K717.13, Dec 1966-Nov 1967, AFHRA, Maxwell AFB.

AFLC Tactics Manual, A-26A. File K200.8633-1, Nov 1968, AFHRA, Maxwell AFB.

Aircrew Weapons Delivery Manual, USAF Series A-26A Aircraft. File K168.92-11, 1 Aug 1969, AFHRA, Maxwell AFB.

Analysis of the Use of Propeller Vs Jet Aircraft in Laos. OASD/SA/SEA Programs Div. File K143.5072-86, Jan-Oct 1967, AFHRA, Maxwell AFB.

Comparative Analysis of Propeller Vs. Jet Aircraft. Directorate Combat Analysis, Headquarters, 7th Air Force. File K143.5072-86, Jan-Oct 1967, AFHRA, Maxwell AFB.

Relative Efficiency of F-4, A-1, and A-26 Aircraft Attacking Trucks in Laos. OASD/SA and AFXDC. File K143.042-31, 9 Oct 69, AFHRA, Maxwell AFB.

Simons, John. *Low-Altitude Reconnaissance/Strike Techniques, Problems.* File K-WG-56-SU-RE, 8 Jul 1967, AFHRA, Maxwell AFB.

Messages and Memorandums:

Bell, Jim. Letter to Denny Lynch, March 18, 1988.

CINCPACAF. Message to 13th Air Force, May 31, 1966. File K717.312-64, AFHRA, Maxwell AFB.

7th Air Force. Message to CINCPACAF, November 8, 1966. File K717.0413-15, AFHRA, Maxwell AFB.

Wollner, R. P. Chief Standardization Group- Headquarters Air Force, Memorandum, March 29, 1965. File K205.0604-2 V.2, AFHRA, Maxwell AFB.

Secondary Sources-

Ballard, Jack S. *Development and Employment of Fixed Wing Gunships, 1962-1972.* Washington: Office of Air Force History, 1982.

Chinnery, Philip D. *Any Time, Any Place, Fifty Years of the USAF Air Commando and Special Operations Forces, 1944-1994.* Annapolis: Naval Institute Press, 1994.

Futrell, Robert F. *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984.* Volume II. Maxwell AFB: Air University Press, 1989.

_____. *The United States Air Force in Korea.* Washington: Office of Air Force History, 1983.

Gilster, Hermann L. *The Air War in Southeast Asia, Case Studies in Selected Campaigns.* Maxwell AFB: Air University Press, 1993.

Guilmartin, John F., Jr. *Criteria for Evaluating Aircraft Combat Effectiveness: An Analytical Framework for Historical Analysis.* Columbus: unpublished manuscript, 2001.

Haas, Michael E. *Apollo's Warriors, United States Air Force Special Operations During the Cold War.* Maxwell AFB: Air University Press, 1997.

_____, and Dale K. Robinson. *Air Commando! 1950-1975: Twenty-five Years at the Tip of the Spear*. File K317.04-4, Aug 94, AFHRA, Maxwell AFB.

Hagedorn, Dan and Leif Hellstrom. *Foreign Invaders: The Douglas Invader in Foreign Military and US Clandestine Service*. Leicester: Midland Publishing, Ltd., 1994.

Johnsen, Frederick A. *Douglas A-26 Invader*. Warbird Tech Series, Volume 22. North Branch: Specialty Press, 1999.

Kelly, Orr. *From a Dark Sky, The Story of US Air Force Special Operations*. Novato: Presidio, 1996.

Momyer, William W. *Airpower in Three Wars*. Washington: Department of the Air Force, 1978.

Mrozek, Donald J. *Air Power and the Ground War in Vietnam*. Washington: Pergamon-Brassey's International Defense Publishers, Inc., 1989.

Porter, Melvin F. *Night Interdiction in Southeast Asia*. HQ PACAF, Project CHECO. File K717.0413-93A, 9 Sep 66, AFHRA, Maxwell AFB.

Robbins, Christopher. *The Ravens, The Men Who Flew in America's Secret War in Laos*. New York: Crown Publishers, Inc., 1987.

Thorndale, C. William. *Interdiction in Southeast Asia, November 1966-October 1968*. HQ PACAF, Project CHECO. File K717.0414-11, Nov 66-Oct 68, AFHRA, Maxwell AFB.

Tilford, Earl H., Jr. *Setup, What the Air Force Did in Vietnam and Why*. Maxwell AFB: Air University Press, 1991.

Trest, Warren A. *Air Commando One, Heinie Aderholt and America's Secret Air Wars*. Washington: Smithsonian Institution Press, 2000.

_____. *Lucky Tiger Combat Operations*. HQ PACAF, Project CHECO. File K717.0413-15, 15 Jan 67, AFHRA, Maxwell AFB.

Van Staaveren, Jacob. *Interdiction in Southern Laos, 1960-1968*. Washington: Center for Air Force History, 1993.

Watts, Barry D. *Unreported History and Unit Effectiveness*. unpublished manuscript.

Wickstrom, Tom. "A-26s, The Rest of the Story." *Air Commando Association Newsletter*, September 1988. 12-13.

_____. "Nimrods, Truck Killers on the Trail." *Air Commando Association Newsletter*, July 1988. 1,8-13.

"THE JUNKYARD AIR FORCE":
THE A-26A NIMROD IN COMBAT OVER LAOS, 1966-69

A Thesis

Presented in Partial Fulfillment of the Requirements for

The Degree Master of Arts in the
Graduate School of The Ohio State University

By

Daniel Simon Hoadley, B.S.

The Ohio State University

2001

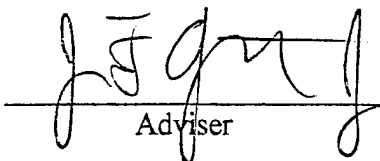
Master's Examination Committee:

Dr. John Guilmartin, Adviser

Dr. Allan Millett

Dr. Peter Hahn

Approved by



Adviser

Department of History

ABSTRACT

This study is a comprehensive history and analysis of A-26A operations during the Vietnam War. The A-26A was a highly effective special operations weapon system used for truck killing against the Ho Chi Minh Trail. The A-26A was at the center of a political debate in the Air Force between advocates of propeller driven aircraft for limited war roles and opponents who favored jets. My thesis is divided into three sections. The first section covers the A-26A's operational history, detailing the tactics, armament, and personalities that made them successful. The next section is an account of the political debate that raged over the A-26A. I discuss the motivations for opposition to propeller driven aircraft and the specific actions taken by opponents to hide and limit the Nimrod's success. The final section is an analysis of the A-26A using a qualitative framework in an attempt to correct flawed wartime reporting and evaluate the aircraft's tactical and strategic effectiveness. As the evaluation demonstrates, the A-26A was a highly successful weapon system that the Air Force failed to exploit.

ACKNOWLEDGMENTS

I would like to thank my adviser, Dr. John Guilmartin, for his advice and guidance in writing this thesis. He made numerous suggestion for improving the content and grammar in this paper. He also offered insights from his own personal experiences and research that improved the overall quality of my thesis.

I would also like to thank my fellow graduate students in History 873b (Spring 2001) made numerous suggestions for improving the content of this paper. I made numerous changes based on their recommendations.

I am indebted to Tom Wickstrom, Joseph Kittinger, Paul Marschalk, Walter Lanford, George Matthews, Nolan Schmidt, and Jim Galuzzi. Tom Wickstrom provided me with several primary source documents that I did not have. He and the other Nimrod aircrews and maintenance personnel graciously answered my questions and provided suggestions for further research. This thesis is their story and I could not have completed it without their input.

VITA

April 3, 1978.....Born – Evanston, Illinois
2000.....B.S. Military History,
United States Air Force Academy
2000-present.....Officer, United States Air Force
Student, The Ohio State University

FIELDS OF STUDY

Major Field: Military History

TABLE OF CONTENTS

	<u>Page</u>
Abstract.....	ii
Acknowledgments.....	iii
Vita.....	iv
List of Tables.....	vii
List of Figures.....	viii
Chapters:	
Introduction.....	1
1. Where They Came From, How They Got There, What They Did.....	4
2. A War of Words.....	23
3. Correcting the Record: A Comprehensive Evaluation.....	38
Conclusion.....	62
Appendices:	
A Pictures.....	65
B Map of Nimrod Area of Operations.....	69
C A-26A Individual Aircraft Record.....	70
D Number of A-26As Deployed to Nakhon Phanom.....	71
E USAF Aircraft Losses in Laos.....	72

F	A-26A vs. F-4 Operational Readiness Comparison.....	73
---	---	----

	Bibliography.....	75
--	-------------------	----

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Results of the OASD/SA and AFXDC Study.....	37
2	Enemy AAA Guns (Photo Confirmed) in Steel Tiger Area of Laos.....	51
3	A-26A Individual Aircraft Record.....	70
4	Selected Data on USAF Losses Over Laos.....	72

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	A-26A at the USAF Museum, Wright-Patterson AFB, Ohio.....	65
2	Wing Armament of the A-26A.....	66
3	A-26A in the Research and Development, Flight Test Hangar, WPAFB.....	66
4	Nose Mounted .50 Caliber Machine Guns.....	67
5	Pratt and Whitney R-2800-52W Engine.....	68
6	Map of Nimrod Area of Operations.....	69
7	Number of A-26As Deployed to Nakhon Phanom.....	71
8	A-26A vs. F-4 Operational Readiness Rate Comparison.....	73
9	A-26A vs. F-4 Comparison of Number of Aircraft Down.....	74

**THE VIEWS EXPRESSED IN THIS ARTICLE
ARE THOSE OF THE AUTHOR AND DO NOT
REFLECT THE OFFICIAL POLICY OR
POSITION OF THE UNITED STATES,
DEPARTMENT OF DEFENSE, OR THE U.S.
GOVERNMENT**

INTRODUCTION

“The great requirement in the organizing of air power is the creation of suitable aircraft and equipment for the men that have to fly them.”

- Brigadier General William ‘Billy’ Mitchell

Few authors who write about air power in Vietnam focus on the Air Force’s technological issues and problems.¹ Initial works on the air war in Vietnam, especially *Airpower in Three Wars* and *Strategy for Defeat*, both written by senior commanders, focused on the political restrictions placed on the Air Force, blaming the Johnson administration for misapplying air power in Southeast Asia. In more recent scholarship, like *The Limits of Air Power* and *Setup, What the Air Force did in Vietnam and Why*, the authors focus on the doctrinal shortcomings of Air Force bombing policy. However, the Air Force’s poor performance, in many cases, can be attributed to the aircraft that it insisted on using. In particular, the Air Force suffered from the misconception that a jet engine and a cool, sleek design equated to absolute combat effectiveness. The A-26A Nimrod is the perfect example of an ‘ugly,’ propeller-driven aircraft that outperformed jets in the night interdiction role from 1966 to 1969. I will argue in the following pages

¹ There are some notable exceptions to this generalization. Marshall Michel’s *Clashes* details the mistakes that the Air Force made in air to air fighter technology over North Vietnam. *Development and Employment of Fixed Wing Gunships* by Jack Ballard, cited later in this work, is another good source on Air Force technology during the Vietnam War. *A Very Short War* by John Guilmartin is also an exception, particularly his appendix on the H-53.

that the Air Force leadership, blinded by political motivation, missed out on an opportunity to exploit this highly effective weapon system.

The A-26A was a World War II aircraft modified for service in Southeast Asia. After service in conventional roles during World War II and the Korean War, the Air Force adopted the aircraft as a special operations weapon system. The Air Force then modified the aircraft to correct some structural problems and deployed the A-26As to Thailand in 1966. The aircraft proved to be tactically flexible and was particularly effective in the truck killing role on the Ho Chi Minh Trail. Nimrods racked up impressive results, showing up jets that were employed in the same mission. My thesis will cover this background on the aircraft, detailing how it was modified, how it got deployed to Southeast Asia, and how it was employed.

The A-26's combat record is only one piece of the aircraft's history. The A-26 was a highly controversial aircraft at the center of a political battle in the Air Force. The heart of the political battle was a debate between advocates of propeller-driven aircraft and generals lobbying for an all-jet Air Force. In addition, the A-26A did not fit the Air Force's profile for a multi-role aircraft under the defense budget constraints of the 1960s. Opponents of the aircraft made concerted efforts to hide and interfere with the A-26's combat effectiveness. This thesis will cover the actions taken by the Air Force senior leadership, citing how they suppressed reports on the Nimrod's performance, exaggerated the aircraft's shortcomings, and skewed the historical record.

In order to correct the record on the Air Force's wartime misgivings, I will use a qualitative framework to evaluate the A-26A's combat effectiveness. This framework

will also evaluate the historical importance of the aircraft's combat record. This analysis of the aircraft's qualities will elucidate the A-26A's strengths and weaknesses to support a positive summation of the Nimrod's tactical and strategic performance. This analysis represents an attempt to understand why the aircraft performed so well; to evaluate the impact of this performance; and to evaluate the Air Force's decision to pull it out of Southeast Asia in 1969.

CHAPTER 1

WHERE THEY CAME FROM, HOW THEY GOT THERE, WHAT THEY DID

“...Nimrod, who grew to be a mighty warrior on the earth. He was a mighty hunter before the Lord.”
- Genesis 10:8-9

The A-26A had its roots in World War II. In 1940, the Air Force awarded a contract to the Douglas Aircraft Company to design an attack aircraft with greater speed and defensive armament than the Douglas A-20 and Martin B-26. The Air Force also wanted an aircraft with a stronger structure and improved take off and landing performance. The Douglas prototype, the XA-26, first flew on July 10, 1942. The aircraft had a light bomb bay and a nose capable of various configurations. The nose could be modified to carry one 75mm cannon, a 37mm cannon, .50 caliber machine guns, or a plexiglass bombardier/observer nose. The Douglas A-26 Invader entered combat in late 1944. Although the aircraft did not see much action, the Air Force judged it successful. Some evaluations even described it as the best light attack bomber of the war. After World War II, the Air Force adopted the A-26 as a mainstay of light bombardment

squadrons. In 1948 the Air Force dropped the Martin B-26 from its inventory and changed the A-26's designation to B-26B.²

The B-26B saw combat again during the Korean War, principally in the night interdiction role. Between 1950 and 1953 the aircraft flew over 12,000 sorties inflicting a great deal of damage on Communist forces. Unfortunately, the aircraft also suffered a great number of losses due to a mix of inaccurate charts that made terrain avoidance difficult and Communist anti-aircraft artillery (AAA).³ Air Force analysts blamed the losses solely on the Invader's apparent vulnerability to AAA and concluded that it was not modern enough to survive on the battlefield. After the war the Air Force put some Invaders in storage and released the rest to foreign nations.⁴ In fact, it was under a foreign flag that the Invader first saw action in Southeast Asia. The United States gave 24 B-26Bs to France in the early 1950s. The aircraft flew numerous bombing and interdiction sorties, including missions over Dien Bien Phu.⁵

The B-26B made its comeback in the early 1960s with employment in a series of CIA and Air Force clandestine operations. The CIA used the B-26 in the Bay of Pigs invasion in 1961, selecting it for its range, which was ideal for the long flight from Nicaragua to Cuba. Although the operation was a failure, the Air Force realized that the Invader had potential and adopted it for continued use in special operations.⁶

² Dan Hagedorn and Leif Hellstrom, *Foreign Invaders: The Douglas Invader in Foreign Military and US Clandestine Service* (Leicester: Midland Publishing Limited, 1994), 7-8.

³ Robert F. Futrell, *The United States Air Force in Korea* (Washington: Office of Air Force History, 1983), 449-460.

⁴ Hagedorn and Hellstrom, 8.

⁵ Frederick A. Johnsen, *Douglas A-26 Invader, War Bird Tech Series*, Vol. 22 (North Branch: Specialty Press, 1999), 53.

⁶ Orr Kelly, *From a Dark Sky, The Story of US Air Force Special Operations* (Novato: Presidio, 1996), 127-129.

The US Air Force first employed the B-26B in Southeast Asia in March 1961 with Project Mill Pond. The Air Force released sixteen B-26Bs from storage at Davis Monthan Air Force Base (AFB), Arizona to Takli Royal Thai Air Force Base (RTAFB) under the command of Major Harry C. "Heinie" Aderholt, an important figure later in the aircraft's history. During Mill Pond, Invaders flew missions against Communist Pathet Lao forces in the Plaines des Jarres. The project did not last long. Two months later, John F. Kennedy and Nikita Khrushchev agreed that the two nations should stop intervention in Laos. Later in May at a conference in Geneva the two countries reaffirmed their agreement on Laotian independence and withdrew all of their military forces.⁷

The Air Force used the B-26B in South Vietnam as part of Projects Jungle Jim and Farm Gate, involving Air Commando crews working with and training the South Vietnamese Air Force. Beginning in March 1961 the aircraft flew strike missions under Forward Air Controller (FAC) direction against Communist forces in South Vietnam. The aircraft went on to perform a variety of missions from interdiction to close air support to photo reconnaissance. Air Force evaluations of Projects Mill Pond, Farm Gate, and Jungle Jim described the Invader as a potent weapon but cited several areas for improvement.⁸

The Air Force had several issues with the B-26B in the early years of its deployment to Southeast Asia. The aircraft was difficult to maintain because it was old and virtually no two aircraft were configured alike. The Invader also had a problem with

⁷ Hagedorn and Hellstrom, 133-135.

⁸ Ibid., 138-144.

the high atmospheric moisture content in Southeast Asia, which created engine problems. Specifically, the ignition system required constant maintenance and crew chiefs had to change the spark plugs frequently.⁹ In the second half of 1962 the aircraft had a 54.5% in commission rate, poor by Air Force standards. Wing spar fatigue, however, was the biggest problem. The Air Force loaded the B-26B with ordnance hung from pylons under the wings. As the Invaders taxied along bumpy airstrips the bomb load on the wings created a negative G force that the wing was not designed to sustain.¹⁰ On August 16, 1963 a B-26B wing failed on a strike mission, killing one Vietnamese and two American crew members. In February 1964 the wing came off of an Invader in flight at Eglin AFB, Florida killing two more Americans. After this accident the Air Force pulled the remaining Invaders out of Southeast Asia.¹¹

During the B-26B's deployment to Southeast Asia, the Air Force planned for a rebuild and redeployment of the aircraft. The Air Force's decision to rebuild the B-26B came during the Kennedy administration when flexible response was the heart of US defense policy. JFK's emphasis on special operations made it relatively easy for the Air Force to get funding for rebuilding an aircraft like the B-26B. The aircraft had an outstanding record of success in special operations and had the added advantage of deniability. Since the US released so many Invaders to foreign nations, the US could plausibly deny involvement if a B-26 was shot down over forbidden territory.¹² The Air

⁹ Joseph W. Kittinger, interview by Robert G. Zimmerman, 5 September 1974, USAF Oral History Interview, File K239.0512-807, Air Force Historical Research Agency (AFHRA), Maxwell Air Force Base (AFB).

¹⁰ Hagedorn and Hellstrom, 142-144.

¹¹ Johnsen, 55-56.

¹² Tom Wickstrom, interview by author, April 11, 2001.

Force planned to replace the deployed B-26Bs with rebuilt aircraft as they came on line, but the plan changed after the accident at Eglin AFB.¹³

In 1963 the Air Force awarded a \$13 million contract to the On Mark Engineering Company in Van Nuys, California to overhaul 40 B-26Bs. The overhaul involved a complete redesign and rebuild of the wing. The company installed 2,500 horsepower Pratt and Whitney R-2800-52W water-injected engines, permanent wing tip fuel tanks, and 8 wing pylons custom built for the aircraft. The company also redesigned the gunpack in the nose, replacing the varied configurations with a standard eight .50 caliber machine guns. The company also updated the cockpit, improving the communications and navigation package with ILS, LF-ADF, TACAN, and VOR¹⁴ for navigation and FM, HF, UHF, and VHF radios. The overhauled B-26, now designated the B-26K, improved performance in several areas. The maximum cruising speed increased from 240 to 265 knots, the standard combat radius jumped from 210 to 500 nautical miles, and the disposable armament load went from 7,500 to 12,000 pounds. The redesign also improved the aircraft's rate of climb and service ceiling.¹⁵

The aircraft made a slow transition to Air Force control. The YB-26K made its first flight on January 28, 1963. On Mark gave the test model to the 1st Air Commando Wing (ACW) at Hurlburt Field, Florida for evaluation and weapons trial at the Special Air Warfare Center in June. The Air Force approved. The company delivered the first

¹³ Tom Wickstrom, "Nimrods Truck Killers on the Trail," *Air Commando Association Newsletter*, July 1988, 9.

¹⁴ Instrument Landing System (ILS)- instrumentation senses the aircraft's position relative to electronic beacons on the ground allowing the pilot to land the aircraft in without visual reference to the ground. LF-ADF, TACAN, and VOR- these are all radio navigation systems, instrumentation detects the aircraft's bearing and range from a radio beacon on the ground.

¹⁵ Hagedorn and Hellstrom, 156.

operational B-26K to the 602nd Fighter Squadron (composite) at Hurlburt Field on June 15, 1964, and delivered the fortieth and last aircraft on April 14, 1965. The Air Force sent 10 B-26Ks to the 605th Air Commando Squadron (ACS) at Howard AFB, Panama, and the CIA took 3 for use in a clandestine operation in the Congo. The remaining aircraft ended up at England AFB, Louisiana as the 603rd ACS.¹⁶

In the mean time the Air Force debated about the newly assigned interdiction mission in Southeast Asia. In December 1964 Lyndon B. Johnson authorized fighter-bombers to conduct armed reconnaissance strikes in Laos. On March 20, 1965 Johnson authorized the start of Operation Steel Tiger. Steel Tiger was an interdiction campaign to stem the flow of supplies down the Ho Chi Minh Trail, with the initial operational boundaries being the Nape Pass in the north to the southern boundary of Laos (see Appendix B).¹⁷

In 1965 the standard North Vietnamese conveyance on the Trail was a Russian built ZIL 157 truck, capable of carrying up to 5 tons at 40 mph. These trucks traveled mostly at night to avoid easy detection and attack during daylight.¹⁸ Analysts at Pacific Air Force (PACAF) decided on the F-100 as the primary aircraft for operations in Laos, reaching their decision because the crews were trained for night interdiction and familiar with the Trail. The experts at PACAF, bent on proving the superiority of jet aircraft, also considered this an excellent opportunity to prove that jets could meet mission

¹⁶ Ibid., 156-157.

¹⁷ Jacob Van Staaveren, *Interdiction in Southern Laos, 1960-1968* (Washington: Center for Air Force History, 1993), 56-59.

¹⁸ Kelly, 193.

requirements by day and night.¹⁹ Soon afterward B-57s, F-4s, and F-105s joined the fight.

In early 1966, William H. Sullivan, the US ambassador to Laos, intervened in the Air Force's interdiction effort. As ambassador, Sullivan received regular reports on the fighter-bomber effort over the Ho Chi Minh Trail, which detailed the number of sorties flown and targets destroyed or damaged. Concerned because the Air Force expended a lot of effort without making a significant change in the traffic flow moving down the Trail, Sullivan decided to use his influence with the Secretary of Defense, Robert Strange McNamara. Later recalling his letter Sullivan stated, "I was no expert in air warfare, but I could not accept the military's contention that high-speed, high-performance jets are the best instruments to attack slow-moving trucks which traveled only at night under a thick jungle canopy. I asked whether the Air Force still had any propeller-driven attack aircraft that could operate at night and could use machine guns and rockets as well as bombs."²⁰ In response the 2nd Air Division sent a force of 6 AC-47 gunships to Udorn RTAFB under the 4th ACS. On February 25, 1966 the 'Spooky' gunships started operations in the night interdiction role in the Steel Tiger and Tiger Hound areas of Laos. The AC-47 tacitly matched Sullivan's request, as it was a World War II transport aircraft converted into a side-firing gunship armed with 7.62 mm miniguns.²¹

¹⁹ Melvin F. Porter, *Night Interdiction in Southeast Asia*, HQ PACAF, Project CHECO, File 717.0413-93A, AFHRA, Maxwell AFB, 13-14.

²⁰ William H. Sullivan quoted in Warren A. Trest, *Air Commando One, Heinie Aderholt and America's Secret Air Wars* (Washington: Smithsonian Institution Press, 2000), 189.

²¹ Jack S. Ballard, *Development and Employment of Fixed Wing Gunships, 1962-1972* (Washington: Office of Air Force History, 1982), 45.

Although the AC-47s performed well in hitting truck traffic on the Trail their vulnerability to ground fire quickly singled them out for withdrawal. Because of the short range of the 7.62mm minigun, AC-47s had to fly relatively close to the ground, drawing them into lethal range of 37mm AAA and small arms fire. The aircraft made very predictable circling attacks on the truck targets. The predictable tactics combined with a slow airspeed of only 180 mph made the AC-47 an easy target.²² In the first half of 1966 the 4th ACS lost 4 aircraft. Analysts predicted that if the Air Force continued to use the AC-47 for night interdiction the gunship force in Southeast Asia would suffer an 80% loss rate over the next full year. On July 20th the Air Force withdrew the 4th ACS from Thailand and detailed the aircraft to South Vietnam for close air support and air base protection.²³

The Air Force searched for a replacement to fill Ambassador Sullivan's request, and at this point the B-26K re-entered the story. The Air Force deployed Detachment 1 of the 603rd ACS to Nakhon Phanom RTAFB (NKP) under the 606th ACS (composite) "Lucky Tigers" on June 11, 1966. The detachment consisted of 8 B-26Ks, 31 officers, and 111 airmen on a 179 temporary duty named Project Big Eagle. Big Eagle aimed to evaluate the B-26K in the night interdiction role with a possible deployment of 12 more aircraft depending on the project's results. According to the plan the aircraft would use varied tactics and ordnance to determine the most effective method of employment for the weapon system.²⁴ At this point the Air Force officially changed the aircraft's

²² Ibid., 47.

²³ Kelly, 157.

²⁴ Warren A. Trest, *Lucky Tiger Combat Operations*, HQ PACAF, Project CHECO, File K717.0413-15, AFHRA, Maxwell AFB.

designation to A-26A for two reasons. First, they reasoned that the updates made in the On Mark rebuild changed the aircraft to an attack weapon system.²⁵ Second, the US had an agreement with Thailand that the Air Force would not deploy bombers to Thai soil, so the Air Force could not retain the 'B' prefix if it wanted to base the aircraft in Thailand.²⁶ Once in theater, A-26A pilots adopted Nimrod as their standard call sign and this eventually became the nickname for the aircraft.²⁷ The first sortie of Big Eagle took place on June 20, 1966.

During the Big Eagle evaluation, the A-26's predominant mission was striking trucks along the Ho Chi Minh Trail and the northern operations area of Laos called Barrel Roll. The majority of their interdiction sorties concentrated between the Mu Gia Pass and Tchepone (see Appendix B).²⁸ Nimrods also flew close air support missions in Barrel Roll supporting the efforts of Royal Lao forces.²⁹ To accomplish their mission during this period the A-26s flew single ship operations, staggered throughout the night. The object was to provide dusk to dawn coverage of the Trail.³⁰

It is difficult to describe a typical sortie because tactics changed so frequently to adjust to the target and environment. However, there were some basic procedures. A truck strike had three phases. In the first phase the Nimrod worked individually and with

²⁵ R. P. Wollner, Chief Standardization Group- HQ USAF, Memorandum 29 Mar 1965, File K205.0604-2 V.2, AFHRA, Maxwell AFB.

²⁶ CINCPACAF to 13th AF, 31 May 66, File K717.312-64, AFHRA, Maxwell AFB.

²⁷ Michael E. Haas, *Apollo's Warriors, United States Air Force Special Operations during the Cold War* (Maxwell AFB: Air University Press, 1997), 196.

²⁸ Joint Operations Graphic (Air), 1:250,000, Charts NE 48-10, NE 48-11, and NE 48-15. These charts belonged to Dr. John Guilmartin who was stationed at NKP just as the A-26s arrived in 1966. His charts have the AAA guns marked, demonstrating that the area between Mu Gia Pass and Tchepone was heavily defended by the North Vietnamese.

²⁹ Trest, *Lucky Tiger Combat Operations*, 1.

³⁰ Tom Wickstrom, "Nimrods, Truck Killers on the Trail," *Air Commando Association Newsletter*, July 1988, 10.

other aircraft to search for targets. In the next phase flareships illuminated the target and communicated with the A-26 crew to direct them to the location. In the final phase the Nimrod made repeated passes on the target area destroying or damaging as many vehicles as possible.

The target identification phase of an attack required a great deal of cooperation with other aircraft. Before they could fly combat missions in the A-26, Nimrod crews flew four sorties in an O-1 (two seat single engine light aircraft) or a C-123 (a twin engine transport with spacious cargo bay). The forward air controllers (FACs) gave new aircrews a tour of the Trail and educated them on the rules of engagement. After their orientation flights Nimrod crews were qualified as FACs and didn't need an additional aircraft to identify targets and authorize strikes. Prior to leaving NKP for the Trail, A-26 aircrews spoke with O-1 FACs who orbited the trail during the day to get the latest updates on AAA locations and possible target concentrations for that night. After their coordination with the daylight FACs, Nimrods took the 30 minute flight from NKP to the Steel Tiger operations area and searched for targets individually.³¹

The most difficult phase of a strike was illuminating the target and setting up the attack run. The A-26 carried flares on its outer pylons, so they could make a quick strike, if necessary. However the A-26 often directed a C-123 'Candlestick' or C-130 'Lamplighter' flareship to their location because they had larger supplies of flares necessary for illuminating the Trail for a lucrative grouping of targets. The flareships used aerial parachute flares to illuminate a general area or ground flares called 'logs' or

³¹ Frank L. Gorski, interview by V. H. Gallacher and Lyn R. Officer, USAF Oral History Interview, File K239.0512-650, AFHRA, Maxwell AFB.

'bricks' to mark spots near a target. Typically trucks went into a hiding place after flares illuminated the open road. In setting up the attack the flareships had to describe the location of the target and establish a run in heading for the Nimrod. Even under flare light distances were difficult to judge at night. Flareship crews started with big landmarks and worked to smaller ones to get the A-26 in the general area. Then they used terms like 'two napalm widths' (regular units of measure were meaningless at night) to get a more precise location for the munitions drop. After the Nimrod crew got a mental image of the target location they set up a box pattern around it for the steep diving attack. In the Barrel Roll area Nimrods frequently worked on their own, identifying and illuminating their own targets.³²

The attack run, by necessity, was the most varied part of the truck strike. Their tactics depended on the weather, tree cover, munitions carried, and rules of engagement. In general the pilot dropped some kind of area or fragmentation munition on the first pass to cause a blockage on the trail and fix multiple trucks in place for repeated attack passes. Throughout their deployment the .50 caliber machine guns proved to be the most effective weapon for destroying trucks.³³ Paul Marschalk, a Nimrod pilot, stated, "There are few if any sensations like lighting off 8 fifty cal machine guns that rest slightly above and in front of your feet."³⁴ To count as destroyed a truck had to burn, and the machine guns proved lethal in starting truck fires. During Big Eagle, the A-26's other mainstay munition was the 750 lb fragmentation bomb. Initially aircrews had a problem with bombs burying themselves in the ground and failing to disperse their full explosive effect.

³² *AFLC Tactics Manual, A-26A*, File K200.8633-1, Nov 1968, AFHRA, Maxwell AFB.

³³ *Ibid.*

³⁴ Paul Marschalk, e-mail to author, April 12, 2001.

To solve the problem crews at NKP welded part of an old .50 caliber machine gun barrel onto the fuse on the front of the bomb.³⁵ The modification improved the bomb's effectiveness, but area munitions that came on board later in the deployment proved to be more effective and easier to use.

The 606th used a variety of methods to accomplish bomb damage assessment. If a truck was obviously on fire after a strike, then it counted as destroyed. To account for the other vehicles hit during an attack, O-1 FACs flew over the previous night's strike areas in daylight to evaluate the remains. Often, O-1 pilots watched as the remains of a truck gradually disappeared. The North Vietnamese disassembled the immovable vehicle piece by piece and took the parts back to hidden repair stations. Sometimes FACs flew to the exact location where a damaged truck should have been sitting and nothing was there. Although they knew that the North Vietnamese had quickly disassembled the entire vehicle, they could not report it as a destroyed or damaged truck. FACs attributed the disappearing vehicles to the "Great Laotian Truck Eater."³⁶ The 606th could also rely on friendly Laotian villagers for battle damage assessments. These collaborators watched the strike locations after an attack and reported back on the extent of the damage.³⁷

In August PACAF decided to extend the Big Eagle trial because of weather. The trial took place in the heart of the Southwest Monsoon. This yearly event from April to mid-October swamped the panhandle of Laos with rain and low clouds. Few trucks were

³⁵ Jim Galuzzi, interview by author, April 12, 2001. The modification pioneered by Galuzzi and his maintenance crews was a temporary fix. Eventually the Air Force acquired bombs with a built in probe on the front of the weapon that accomplished the same task. See Appendix A for a picture of the 'officially' modified bomb hanging from the A-26's wing.

³⁶ Hagedorn and Hellstrom, 163.

³⁷ Trest, *Lucky Tiger Combat Operations*, 16.

able to travel the thick mud on the Ho Chi Minh Trail caused by the wet weather, and poor weather conditions often caused sortie cancellations for the Nimrods. In the interest of conducting a fair evaluation of A-26 effectiveness PACAF extended Big Eagle until January 13, 1967.³⁸

The evaluation demonstrated success. During the six month test period the A-26 flew 1,349 sorties, dropped 2,126 tons of bombs, and expended 717, 595 .50 cal rounds.³⁹ During the month of December, 7th Air Force flew 3,000 sorties against the Trail and destroyed or damaged 195 trucks. The A-26 flew only 195 of those sorties while accounting for 126 of the trucks destroyed. In sum, the Nimrods inflicted 64% of the combat damage flying only 7% of the sorties for the month. In their reply to the report on the Big Eagle test, the PACAF Tactical Evaluation Center recommended "priority consideration" for a permanent force of A-26s in Southeast Asia. In December 1966 Detachment 1 of the 603rd ACS became a permanent part of the 606th ACS, and they began transition from TDY to PCS status personnel.⁴⁰

On December 10, 1966 Colonel Harry C. "Heinie" Aderholt re-entered the story as commander of the 606th ACS and several changes came with him.⁴¹ Aderholt adopted hunter-killer team tactics to foster more coordination among the squadron's aircraft. Aderholt also acquired new munitions and equipment that improved the effectiveness of A-26 operations. In organizational changes the 606th ACS became the 56th Air

³⁸ Ibid., 8.

³⁹ Philip D. Chinnery, *Any Time, Any Place, Fifty Years of the USAF Air Commando and Special Operations Forces, 1944-1994* (Annapolis: Naval Institute Press, 1994), 145.

⁴⁰ Trest, *Lucky Tiger Combat Operations*, 18-19.

⁴¹ Trest, *Air Commando One*, 182.

Commando Wing in April 1967, a more accurate reflection of the unit's size, and the A-26s separated from the 606th to form the 609th ACS in September 1967.⁴²

The hunter-killer team tactics developed under Aderholt's direction made a decisive improvement in A-26 operations. A-26s and AT-28s went out on the trail paired with a C-123 or an O-1 to search for targets. The pairing ensured maximum observation of the Trail with more aircrews searching for targets. Once an aircrew located a group of targets, the A-26 had a flareship on hand to illuminate the target immediately and roll in for a strike. The aircraft team eliminated the time consuming step of waiting for the flareship to arrive, and it gave trucks less time to escape once they were spotted.⁴³

The adaptation of the AN/PVS-2 starlight scope⁴⁴ for use in the C-123 and the A-26 also improved the aircrafts' target acquisition capability. Aderholt acquired the starlight scopes through CIA back channels. He knew that if he requested them through official Air Force networks he would never get them.⁴⁵ Aderholt had many Combat Controllers at NKP with very little to do. At the time, Major Tom Wickstrom was a navigator in the C-123, and he wanted to change over to the Nimrod. Aderholt agreed to approve the change if Wickstrom could find a way to put the starlight scope in the A-26, similar to the way it was used in the Candlesticks. Wickstrom worked with Jim Galuzzi, a maintenance officer, to suspend the scope from a bungee cord over the bomb bay so that it faced down at the Trail. Then they rigged a harness system so that the Combat

⁴² Ibid.

⁴³ *History of the 609th ACS*, File K-WG-56-HI, Oct-Dec 1967, AFHRA, Maxwell AFB.

⁴⁴ The starlight scope magnified ambient light from the stars and moon to allow improved sight at night. It also magnified objects 2.5 times. The scopes were originally developed by the Army and used as sights on M-16 rifles.

⁴⁵ Harry C. Aderholt, interview by Hugh N. Ahmann, USAF Oral History Interview, File K239.0512-1716, AFHRA, Maxwell AFB.

Controller could hang out over the open bomb bay to operate the scope. For comfort and protection of the operator's lower body they put a mattress on top of fiberglass sheets from old flare-boxes in the bottom of the bay. Then they wired a headset and microphone into the bomb bay area so that the scope operator could communicate with the pilot and navigator in the cockpit.⁴⁶ This ingenious system was highly effective in acquiring targets for night strikes.

In 1967 Nimrods adopted area coverage munitions as the mainstay of their strikes. A-26 crews found that napalm was a highly effective weapon for making the initial stop on a truck convoy. The burning napalm also illuminated a large area on the ground, making subsequent strikes easier. The crews also adopted cluster bomb units (CBU) as a standard ordnance for flak suppression.⁴⁷ The A-26 aircrew's favorite weapons, by far, were the Mk 31 and Mk 32 'funny bombs.' These bombs were a combination of white phosphorous, napalm, and CBUs. As the bomb dropped from the aircraft it split open and the white phosphorous ignited the contents. When it hit the ground the CBUs exploded and blew the burning phosphorous and napalm over an area the size of a football field.⁴⁸ The Mk 31/32 bombs covered the same destructive area as twenty 750 lb bombs.⁴⁹ Although the A-26 could deliver ordnance very accurately, the crew often did not know a precise location for the target. These munitions were effective because they spread out over a large area and did not require a precise target location to cause damage.

⁴⁶ Tom Wickstrom, interview by author, March 30, 2001. and Jim Galuzzi, interview by author, April 12, 2001.

⁴⁷ *AFLC Tactics Manual, A-26A.*

⁴⁸ Wickstrom, "Nimrods, Truck Killers on the Trail," 11.

⁴⁹ *AFLC Tactics Manual, A-26A.*

Unfortunately for the 56th ACW, these area coverage munitions went in and out of supply throughout 1968 and 1969. 'Funny bombs' were especially rare, and Aderholt had to work very hard to ensure a ready supply for strikes. At one point he found a stockpile of 'funny bombs' in South Vietnam left over from World War II, so he traded the South Vietnamese one fragmentation bomb for 2 funny bombs.⁵⁰ At other times the wing had to go without until the weapons came in stock. Napalm and CBU's suffered from similar shortages. To some extent the A-26's effectiveness was dictated by its ordnance load, so strike results made noticeable changes when area coverage munitions went out of stock. However, the aircraft's tactical adaptability allowed the 609th to continue successful attacks.

Although the A-26 was notorious for its truck killing capability, Nimrods also acquired a good reputation as a close air support aircraft in 1967 and 1968. In one notable instance in May 1967, a series of A-26 sorties in the Barrel Roll area stopped an enemy attack on an American Lima Site.⁵¹ In February 1968 the A-26 flew several sorties in support of the Marine Corps fire base at Khe Sanh. With its area covering ordnance and strafing capability the Nimrods were very successful at finding and striking NVA machine gun positions.⁵² Aside from being excellent in the night interdiction, the A-26 proved to be a versatile aircraft in other tactical roles.

In early 1968, 7th Air Force mandated a change in Nimrod rules of engagement. The experts in Saigon felt that the A-26 had suffered too many losses to AAA. According to the new rule the minimum release altitude for the A-26 was 5,000 ft above

⁵⁰ Wickstrom, interview by author.

⁵¹ *History of the 606th ACS*, File K-WG-56-HI, Apr-Jul 67, AFHRA, Maxwell AFB.

⁵² *History of the 56th ACW*, File K-WG-56-HI, Jul-Sep 68, AFHRA, Maxwell AFB.

ground level (AGL) with a maximum of six passes over any target area. The new rules required an adaptation in A-26 tactics. The new, higher minimum release altitude made it a little more difficult to put weapons on a precision target, especially on strafing runs, and the 6 pass limit certainly curtailed the aircraft's ability to destroy all of the trucks in a convoy. The 609th quickly adapted to the new rules. In April 1968 the squadron destroyed 459 trucks, shattering the previous monthly record. The squadron's kills for the April to June quarter 1968, more than doubled the previous quarter with 831 trucks destroyed.⁵³

In early 1969, Nimrods crews added a new adaptation to their standard tactics. The A-26s flew in two ship attack teams. One aircraft orbited 500 feet above the other with CBUs and other flak suppressing weapons. The low aircraft carried funny bombs and other area munitions for truck strikes. The high aircraft drew AAA fire and occupied enemy defenses with CBU attacks while the low aircraft went in for the truck strike. This tactic was more effective than the previous hunter killer team tactic because the two aircrews knew one another's capabilities and tactics.⁵⁴ With this coordination Nimrods worked together more safely and conducted more effective strikes.

Nimrod operations made a gradual change for the worse about the same time as the adoption of two ship strikes. On April 1, 1968 President Johnson stopped all bombing of North Vietnam, north of the 20th parallel, and on October 31, 1968 he stopped bombing of North Vietnam completely. With targets in North Vietnam off limits, the Air Force's jet aircraft had little to do. Operation Commando Hunt, a new

⁵³ *History of the 609th ACS*, File K-WG-56-HI, Apr-Jun 68, AFHRA, Maxwell AFB.

⁵⁴ *History of the 56th SOW*, File K-WG-56-HI, Apr-Jun 69, AFHRA, Maxwell AFB.

interdiction campaign in southern Laos, opened in late 1968. Nimrod crews had many frustrating experiences as jet aircraft moved in to their area of operations. First, jet strikes required a large number of aircraft. Jet pilots were not qualified as FACs so they needed an O-1 or an OV-10 to direct them to the target area. The jet pilots also needed a flareship to illuminate the target area, and of course, jets always had a wingman accompanying them on the attack. If an A-26 was working an area of trail where jet aircraft came in to strike these requirements made for a dangerous concentration of aircraft. Frequently, Nimrods were called off in the middle of their strike runs so that jets with low fuel could make their attack runs and return to their base. To avoid the danger, 7th Air Force fragged⁵⁵ A-26s more and more to the Barrel Roll area.⁵⁶

In November 1969, 7th Air Force decided to shut down the 609th Special Operations Squadron (SOS)⁵⁷ and withdraw the A-26As from Southeast Asia. The Air Force's official justification for the withdrawal was an increasing logistics cost for a small number of aircraft. Prior to its closure Nixon awarded the Presidential Unit Citation to the 609th SOS for, "extraordinary gallantry in connection with military operations from October 1, 1967 to April 30, 1968."⁵⁸ The Air Force ferried the 15 A-26s from NKP to Clark AFB in the Philippines. The Air Force gave five of those aircraft to the South Vietnamese. The South Vietnamese Air Force based them at Nah Trang and used them for pilot training. The aircraft survived until 1975 when the NVA destroyed

⁵⁵ This term comes from the orders that the Air Force distributed, specifying the location, aircraft type, and ordnance for strikes. Each unit received a fragment of the order for each day. The verb form 'frag' or 'fragged' comes from this fragmentary order.

⁵⁶ Hagedorn and Hellstrom, 164.

⁵⁷ The squadron's change in nomenclature came in mid 1968. It was a standard change in unit naming Air Force wide, dropping 'Air Commando' for 'Special Operations.' The 56th ACW changed at the same time to the 56th Special Operations Wing (SOW).

⁵⁸ Hagedorn and Hellstrom, 167.

them as they passed through on their way to Saigon. The remaining aircraft at Clark AFB were ferried to Davis Monthan AFB and put in storage. The Air Force maintained several Nimrods in working order until February 28, 1973 when it dropped the aircraft from the operational inventory.⁵⁹

⁵⁹ Wickstrom, "A-26s, The Rest of the Story," *Air Commando Association Newsletter*, September 1988, 12-13.

CHAPTER 2

A WAR OF WORDS

“I think there were a lot of people that were really in the know that realized how effective that weapon system was. But when the boss doesn’t believe in it, you are in a world of trouble.”
-Colonel Joseph W. Kittinger, A-26A pilot⁶⁰

The story of the A-26A does not end with a simple recounting of its operational history. Despite the A-26’s outstanding performance, the Nimrod was the object of intense debate between generals and politicians. The heart of the debate was a disagreement over the effectiveness of propeller driven aircraft. Advocates of propeller driven airplanes pointed to the A-26 as an example of their enduring value, while opponents insisted that jet aircraft could perform the same job as the A-26 with less losses and better results. In the process of debating, opponents of the A-26A suppressed official reports of Nimrod performance and made concerted efforts to minimize its effectiveness.

The largest motivating factor behind opposition to propeller driven aircraft like the A-26A was a campaign for an all jet Air Force. This campaign started during the

⁶⁰ Kittinger, USAF Oral History Interview.

Korean War as jet aircraft first entered service in a combat role for the US Air Force. Using aircraft survivability as their primary criteria for aircraft effectiveness, Air Force generals pointed out that jets had a much stronger record of surviving areas heavily defended by AAA. Thus, they argued that jets should replace propeller driven aircraft as the mainstay of Air Force armament. During the Vietnam War the campaign for an all jet air force continued. In the late 1950s and early 1960s defense analysts noted that the Soviet Union had a very large air force, outnumbering that of the United States in aircraft by several hundred. Air Force generals decided that to compensate for lack of numbers the US would concentrate on quality. In their minds quality and effectiveness meant jets.⁶¹ Consequently, the drive continued for generals to show the supremacy of jet aircraft over propeller driven aircraft in performing all missions.

A related but distinct motivation behind the drive to get rid of propeller driven aircraft dealt with the Air Force's policy on conducting limited war. A position paper entitled "The USAF Concept for Limited War," published in 1962, gave a good summary of the organization's general sentiment. First, general war was the main focus, and spending on any aircraft designed to fight less than a general war was not to infringe on the general war capability. The paper also stated that military forces should be designed with range, mobility, flexibility, speed, penetrative ability, and firepower that could perform in Cold, limited, and general war situations. Finally, the paper stated that a nation with technological superiority should use it to create the most effective weapons

⁶¹ Haas, 192.

systems possible to compensate for deficiencies in areas like total manpower.⁶² Since the A-26A was designed almost exclusively for a limited war role it did not fit the Air Force's mold of an ideal multi-role aircraft and constituted a waste of resources.

Another factor below the surface was a battle over service roles and missions. The Air Force fought with the Army over control of air assets and what aircraft would be used to perform what mission. The Air Force continued to strive for greater autonomy, wanting to show how decisive air power could be on its own. In the minds of many Air Force generals, giving priority to slower aircraft implied an emphasis on the ground effort. In addition, the Air Force did not want to subordinate jets to propeller driven airplanes by having F-4s fly AAA suppression for a prop driven attack aircraft.⁶³

General William Momyer's drive for centralized control of all air assets also influenced A-26A operations. Momyer wanted to expand his powers as 7th Air Force commander from control of air assets in Southeast Asia to all air assets involved in the Vietnam War, making him the de facto air commander for the theater. However, under the official command and control arrangements for the theater it was tough for him to attain centralized power. B-52s remained under Strategic Air Command's control, and 13th Air Force still had authority over many air assets in Southeast Asia. It was also a difficult task because of the variety of aircraft and diverse missions, making it nearly impossible for Momyer to understand the best doctrine for all of these planes.⁶⁴

⁶² Robert F. Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984*, Vol. II (Maxwell AFB: Air University Press, 1989), 57.

⁶³ Donald J. Mrozek, *Air Power and the Ground War in Vietnam* (Washington: Brassey's, 1989), 129.

⁶⁴ Trest, *Air Commando One*, 178.

The debate on the A-26 began with exchanges between General Momyer and William Sullivan, US ambassador to Laos. As ambassador to Laos, Sullivan had input into where aircraft could operate and the rules of engagement. With his campaign for a dedicated force of propeller driven aircraft in early 1966, Sullivan emerged as the highest-level advocate for the A-26. Colonel Harry "Heinie" Aderholt joined forces with Sullivan after his appointment to command of the 56th ACW in December 1966. In correspondence with Momyer regarding the A-26 Sullivan signed 'Sopwith Camel Company,' while Momyer's replies were signed '20th Century Avionics.' These seemingly innocent exchanges revealed a deeper disagreement between the two about how to conduct interdiction on the Ho Chi Minh trail.⁶⁵

Overlaying the conflict between Sullivan and Momyer, was an even more contentious battle between Momyer and Aderholt. Personally and professionally Momyer and Aderholt had clashing personalities. Momyer was a strong-willed fighter pilot, unwavering in his beliefs on how to conduct air warfare, and Aderholt was a determined troop commander willing to sacrifice his career to stand up for his convictions. Momyer was Aderholt's commander and outranked him by four grades. Momyer and Aderholt had a disdain for one another prior to this deployment, and it continued. During Aderholt's tenure as 56th ACW commander, he received 5 letters of reprimand from Momyer.⁶⁶ Momyer barred Aderholt from attending the monthly meeting of all wing commanders in 7th Air Force, so that Aderholt could not present any

⁶⁵ Ibid., 189.

⁶⁶ Jim Galuzzi, interview by author, April 12, 2001.

damning evidence against jet performance.⁶⁷ Although the two commanders' personal dislike for one another colored interaction between them, the conflict went deeper. It was founded in divergent and irreconcilable ways of doing business.⁶⁸

General Momyer worked to get rid of the A-26A almost immediately after the aircraft's deployment. Momyer expressed his opposition in a message to PACAF just prior to the conclusion of Big Eagle on November 8, 1966. He stated that the mission in Laos could be more effectively performed by F-4s. However, as he points out, there was a shortage of F-4s. He recommended retention of the A-26 only until more F-4s could be made available to replace them.⁶⁹

Without Momyer's support, Sullivan and Aderholt had problems trying to get more A-26s into Southeast Asia. After the Big Eagle trial Sullivan sent up a request to transfer 6 more Nimrods to Thailand. Momyer objected on the grounds that the A-26 was too vulnerable to AAA and had not been that impressive in the combat trial. Admiral U.S.G. Sharp, commander in chief, Pacific Command (CINCPAC), sided with Sullivan, stating that A-26 showed potential during Big Eagle. He sent up a request to the Joint Chiefs of Staff for more Nimrods. The Joint Chiefs of Staff prepared orders to have 5 more A-26s transferred to Laos, but McNamara sided with Momyer and canceled the transfer.⁷⁰

A series of controversies over A-26A performance, spanning Aderholt's tenure as 56th ACW commander, started with a request from General Hunter Harris, commander of

⁶⁷ Trest, *Air Commando One*, 189-190.

⁶⁸ Wickstrom, interview by author, March 30, 2001.

⁶⁹ 7th Air Force to PACAF, 08 Nov 66, File K717.0413-15, AFHRA, Maxwell AFB.

⁷⁰ Van Staaveren, 175.

13th Air Force. Under the confusing command and control arrangements in Southeast Asia, 13th Air Force retained logistic and support responsibilities for the 56th ACW while 7th Air Force had operational control. Before retiring, Harris sent a request to all of his wing commanders for recommendations on “improving efficiency” and “winning the war.” Aderholt sent him a report on improving A-26 operations.⁷¹

Aderholt wanted to improve efficiency by centralizing A-26A operations in Southeast Asia at NKP. His recommendations included increasing the authorized strength of Nimrods at NKP to 16, allowing the squadron to conduct 20 sorties each night. Aderholt reported that 20 sorties could deny the enemy any safe-haven throughout hours of darkness. He argued that using the A-26 in Steel Tiger and Barrel Roll would release 14 “high cost, high performance jet aircraft for geographically deeper targets” and save the Air Force a lot of money. Aderholt recommended moving the Nimrod training unit to Clark AFB in the Philippines. He stated that having the training unit in close proximity to operational units would aid in faster incorporation of combat experience into training. In addition, training at Clark would allow for realistic sorties over a jungle. Aderholt argued that his recommendations would reduce costs by centralizing maintenance in Southeast Asia. This would make more spare parts and aircraft available, and it would cut costs by creating a single pipeline for A-26 logistic support.⁷²

Aderholt’s plan immediately evoked a response from Momyer. Aderholt sent the plan to 13th Air Force directly, while sending a courtesy copy to Momyer’s office at 7th Air Force. Upon receiving the plan, Momyer was furious. He wanted to know why

⁷¹ Aderholt, interview by Ahmann, 124.

⁷² Trest, *Lucky Tiger Combat Operations*, 23-24.

Aderholt did not consult with him directly because the plan had several contingencies that directly affected 7th Air Force operations. Momyer refused to consider implementing the plan. When confronted with subsequent reports on the A-26's outstanding performance, Momyer reportedly said, "I don't want to hear about it!"⁷³

Sometime afterward, Ambassador Sullivan and Senator Stuart Symington, an influential member of the Senate Armed Services Committee, visited Nakhon Phanom. Aderholt and Major Joe Kittinger briefed them on their proposal and the success of A-26A operations. Symington was less than receptive. He asked, "Are you trying to tell me this B-26 is better than this F-4 that we built in my St. Louis?" Aderholt replied, "All I'm telling you is that I'm comparing the record. If you draw that conclusion..."⁷⁴ Sullivan, however, was impressed and worked to get more recognition for the A-26.

The next political controversy arose when Sullivan invited Aderholt to the Southeast Asia Coordinating Committee (SEACoord) meeting to discuss his proposal on the A-26A. SEACoord was a gathering of all of the ambassadors and high-level military officials in Southeast Asia to discuss pertinent issues on the war effort. Aderholt told Sullivan that it was a bad idea for him to attend without Momyer's permission. Sullivan called Momyer and inquired about allowing Aderholt to attend. Confronting a civilian of equal or higher rank than his own, Momyer consented. Before the meeting Momyer cornered Aderholt and accused him of being disloyal to the Air Force with his previous proposals and briefings. Momyer said, "We are going in this SEACoord

⁷³ Aderholt, interview by Ahman, 125.

⁷⁴ Ibid.

meeting, and you are not going to say one word. I have you in there because the Ambassador made an issue, but you will not say a word.”⁷⁵

The meeting turned into one of Aderholt’s most frustrating experiences. First, 7th Air Force officials briefed on a proposal to increase the number of B-52 sorties to the Tchepone area of Laos. Sullivan was reluctant to approve because he felt the B-52s were not very effective. He agreed to increase the sorties if Aderholt could brief his proposal on the A-26A. Aderholt knew he was treading on thin ice and gave a short version of his proposal. After the briefing Momyer turned to Sullivan and said, “The colonel is not familiar with all the Air Force requirements. The 26s he has requested are deployed to SOUTHCOM (Panama).” Sullivan replied, “Well, Spike [Momyer’s nickname], I didn’t know they had a war in Panama.” Momyer proceeded to berate Aderholt and remind him of the 56th ACW’s status as an ‘underling’ of 7th Air Force. Aderholt quickly left the meeting. When Sullivan’s Air Attaché asked him where he was going Aderholt said, “I’m going to get on this airplane before I have to knock a four-star general on his ass.”⁷⁶

Momyer sent an official memorandum to the 56th ACW after the SEACORD meeting stating that there was no target in Southern Laos worth losing an aircraft or pilot. Momyer implied that further losses of Aderholt’s prop aircraft would constitute a misuse of resources. Momyer also intimated that if Aderholt lost any more aircraft he could justify pulling the airframes out of the theater using this rationale. Aderholt was furious. Still, he had to motivate his aircrews in spite of Momyer’s message. He told them that

⁷⁵ Ibid., 125-126.

⁷⁶ Ibid., 126.

targets in Laos were, "worth every pilot and every airplane in this organization." He argued, "Every time a truck gets through, we lose Americans in South Vietnam."⁷⁷

One of the other contentious issues was the command and control arrangement for the 56th ACW. All of their missions were fragged by 7th Air Force. Officers at 7th Air Force dictated the number and location of sorties along with armament loads. The arrangement was inherently inefficient. The A-26s were based in Thailand. The targets were in Laos, and the headquarters assigning missions was in Saigon.⁷⁸

One of the biggest problems coming from the command and control arrangement was the number of sorties allocated by 7th Air Force. The orders consistently allocated less sorties than the 56th ACW was prepared to fly. Sometimes it was an issue of maintenance crews that worked hard and made an extra aircraft available. Other times 7th Air Force simply refused to allocate an adequate number of missions for a given night.⁷⁹ Partially the mistake can be explained by the headquarters' distant location and unfamiliarity with the 56th ACW's operations. In the opinion of many Nimrod aircrews, this was a concerted effort to put a cap on the success of A-26 operations.⁸⁰

Another problem arising from command and control by 7th Air Force was the kind of munitions allocated to the 56th ACW. Nimrod crews found that funny bombs were the best weapons for stopping trucks with napalm as a close second. However, 7th Air Force officials insisted on giving them an inordinate amount of rockets and bombs. Rockets

⁷⁷ Ibid., 127.

⁷⁸ B. L. Bonwit, USAF Oral History Interview, File K239.0512-064, Reel 1, AFHRA, Maxwell AFB. Lt Col Bonwit was an A-26 navigator at NKP from Jan to Dec 1967.

⁷⁹ Harry C. Aderholt, *End of Tour Report, Commander 56th ACW*, File K717.13, Dec 1966-Nov 1967, AFHRA, Maxwell AFB, 10.

⁸⁰ Joseph W. Kittinger, e-mail to author, April 14, 2001.

were not effective in truck attacks and caused a problem because firing them pinpointed the aircraft for enemy gunners and caused temporary night blindness for aircrews.⁸¹ The attack orders for the A-26 from 7th Air Force frequently put them over the trail with napalm and bombs on the wing pylons.⁸² The aircraft had a series of 8 switches, one for each pylon, to select which weapon would drop. In a blacked out cockpit it was very easy to hit the wrong switch and release a bomb when one meant to release napalm.⁸³ This made for a dangerous situation when the aircraft flew low over the trail to release napalm and accidentally released a bomb. The Nimrod could be hit and severely damaged by bomb fragments.⁸⁴

Aderholt recognized the danger posed by the munitions supplied and took action. He refused to use the rockets sent by 7th Air Force, and he stockpiled them on base. To solve the problem of munitions mix on the wings Aderholt changed the loading to put napalm on the wing pylons and bombs in the bay. During an inspection trip, a 7th Air Force official noticed the stockpiled munitions and the aircraft loaded contrary to their frag orders. Aderholt explained the danger and ineffectiveness of using rockets and the problems with ordnance mixing on the wings. The inspector angrily replied, "We will tell you what to put on those airplanes and you will adhere to it."⁸⁵ Aderholt ignored the order. After the inspection, instead of stockpiling the munitions he gave the unused rockets to Air America, the CIA's contract airline supporting operations in Laos.

⁸¹ Aderholt End of Tour Report, 9.

⁸² Kelly, 135.

⁸³ *Aircrew Weapons Delivery Manual, USAF Series A-26A Aircraft*, File K168.92-11, AFHRA, Maxwell AFB.

⁸⁴ Kelly, 135.

⁸⁵ Quoted in Trest, *Air Commando One*, 199.

In early 1968 Momyer changed the 56th ACW's reporting procedures. Originally, the wing forwarded results to 7th Air Force, CINCPAC, the Joint Chiefs of Staff, and embassies in Bangkok, Vientiane, and Saigon. Under the new rules the wing sent its results only to 7th Air Force. Once there, 7th Air Force consolidated the 56th ACW's results with other wings before sending the report to Air Force Headquarters. The Air Commandos' results were lumped with the other wings and credited to jet aircraft. The new procedure made it seem that the kills occurred in North Vietnam and that jets accounted for all of the truck kills. The Air Force also released this consolidated report to the press, so high-level officers and the American public got the false impression that jets rather than A-26s were having the most effect in the interdiction campaign. Aderholt states that the reporting procedure change came suspiciously at a time when the Pentagon was debating about the relative effectiveness of jets versus prop-driven aircraft.⁸⁶

On November 19, 1967 Aderholt completed his tour as commander of the 56th ACW and compiled his end of tour report. The report was very critical of 7th Air Force's interdiction operation, and Aderholt offered suggestions for improving the program by adopting the 56th ACW's tactics. Before arriving at his next assignment Aderholt had to brief General John D. Ryan, PACAF commander, on his report. Aderholt reported in to Ryan, but the General stood with his back to the colonel and refused to acknowledge his presence. Aderholt took the hint and left without a word. Aderholt stated, "I could take the personal hostility, but not the insult to the men of the 56th Wing."⁸⁷

⁸⁶ Ibid., 208-209

⁸⁷ Ibid., 212.

Most of the remaining debate on the A-26 took the form of official reports debating the merits of propeller-driven versus jet aircraft. In late 1967 Sullivan and Eugene M. Locke, US Deputy Ambassador to Saigon, asked the Office of the Secretary of Defense (OSD) to analyze the performance of prop versus jet aircraft against the Ho Chi Minh trail.⁸⁸ The report's results overwhelmingly favored prop driven aircraft. According to the report in the first 8 months of 1967 prop driven aircraft destroyed or damaged 996 vehicles, hitting 12.8 targets for every 100 sorties flown, at a cost of \$55,000 per target. On the other hand F-4s and F-105s destroyed or damaged 336 vehicles, hitting only 1.5 targets for every 100 sorties flown, at a cost of \$700,000 per target. The analysis used a complicated formula considering number of sorties flown, cost per sortie, and number of targets hit to come up with a figure that propeller driven aircraft were 10 times as effective as jets at destroying trucks. The report recommended replacing two F-4 squadrons with two A-1E squadrons since there weren't enough A-26s available for another squadron. It stated that in the event of an A-1 replacement the aircraft would likely destroy or damage 1200 more trucks in the next 12 months at a savings of \$28 million. On the negative side the report stated that prop-driven aircraft were 4 times more vulnerable to AAA, and the deployment would likely cost 18 downed aircraft with 8 pilots lost. It also stated that if the Air Force did move the 8 A-26s from Panama to Thailand, attrition would exhaust the inventory by December 1968.⁸⁹

In the wake of the 1967 report McNamara solicited responses from major field commanders. Admiral Sharp stated that the US must put an emphasis on interdicting

⁸⁸ Van Staaveren, 242.

⁸⁹ *Analysis of the Use of Propeller Vs Jet Aircraft in Laos*, OASD/SA/SEA Programs Division, File K143.5072-86, AFHRA, Maxwell AFB.

sources of supply in North Vietnam, making the report on interdiction in Laos irrelevant. Sharp also stated that the seasonal nature of the war demanded "fast reacting" strikes that only jets could provide. General Momyer argued that the analysis was faulty because it did not consider the flak suppression, escort, and strikes on fixed targets flown by jets. He stated the report was misleading because it made jets seem less effective than they really were. In addition, Momyer bemoaned the continued financial cost of maintaining propeller driven aircraft when the money could be used for employing and testing newer high performance jets.⁹⁰

To emphasize their opposition and correct the perceived wrongs of the OSD report Momyer launched an independent 7th Air Force study. The introduction to the report stated that an aircraft taking part in any serious interdiction effort in Southeast Asia must have the ability to operate in Laos and Route Package I because of the changing seasons.⁹¹ The report stated that enemy defenses in Route Package I precluded propeller driven aircraft operations. In turn, the prop aircrafts' inability to operate in Route Package I denied 7th Air Force the flexibility necessary for an effective interdiction campaign. The report also stated that the OSD study lumped F-4s and F-105s with F-102s, F-104s, F-100s, F-8s, and A-4s. These additional aircraft flew few if any sorties over Laos during the period in question and only diluted the effectiveness of jet aircraft. To correct the wrongs of the previous study the 7th Air Force analysis confined itself to a comparison of A-1s, A-26s, and AT-28s with F-105s, F-4s, and B-57s. The report also

⁹⁰ Van Staaveren, 242.

⁹¹ The Southwest Monsoon swamped the Laotian panhandle from April to October. However, while that was going Route Package I on the other side of the mountains had good weather. During the Northeast Monsoon Route Package I had bad weather while the panhandle of Laos was clear.

took into consideration truck kills made by jets in Route Package I and Laos. After refiguring the numbers the study concluded that propeller driven aircraft were only 2 times as effective as jets in destroying trucks.⁹²

An independent study completed by a joint commission of the Air Force Chief of Staff's Air Staff and the Systems Analysis branch of the OSD further investigated the numbers on A-26 effectiveness. The Chief of Staff's Office sided with Momyer against propeller driven aircraft, and their study is an attempt to justify withdrawal of the A-26. The study covered a different time period, encompassing all of 1968 and the first six months of 1969. The study went back to a comparison of truck kills solely in Laos, and it compared the A-26 and A-1 to the F-4. The study tracked the number of trucks destroyed or damaged per 100 attacks (see Table 1 for results). Overall, the study concluded that the propeller driven aircraft were 3 times as effective in destroying or damaging trucks as the jet. However, the study also stated that aircraft efficiency is influenced by the intensity of the AAA threat. The report stated that, considering this factor, the Air Force had to choose the F-4 for the interdiction mission because it was the only aircraft of the three capable of persevering in the heavily defended areas of Laos.⁹³

⁹² *Comparative Analysis of Propeller vs Jet Aircraft*, Directorate Combat Analysis, Headquarters, 7th Air Force, File K143.5072-86, AFHRA, Maxwell AFB.

⁹³ *Relative Efficiency of F-4, A-1, and A-26 Aircraft Attacking Trucks in Laos*, OASD/SA and AFXDC, K143.042-31, AFHRA, Maxwell AFB.

	Total Attacks Against Trucks	Total Trucks Destroyed or Damaged	Trucks Destroyed or Damaged per 100 Attacks
F-4	5850	1220	21
A-1	2940	1021	35
A-26	4401	2856	65

Table 1: Result of the OASD/SA and AFXDC Study

Source: *Relative Efficiency of F-4, A-1, and A-26 Aircraft Attacking Trucks in Laos*, OASD/SA and AFXDC, K143.042-31, AFHRA, Maxwell AFB.

Opposition to the A-26 did not end in 1969 with its withdrawal from Southeast Asia. In his post-war writing Momyer continued to present biased and inaccurate information on the Nimrod. Momyer's Corona Harvest report referring to the A-26 states that the Air Force, "should not waste scarce time and money developing specialized aircraft for counterinsurgency."⁹⁴ In *Airpower in Three Wars*, Momyer stated that the A-26 was a poor airframe for interdiction because it killed a low number of trucks per pass. Momyer also falsely stated that Air Force had to pull the A-26 out of Southeast Asia in 1967 because of vulnerability to AAA.⁹⁵

The effects of the political battle over the A-26 were almost exclusively negative. It is clear that administrative actions taken by 7th Air Force officials hampered Nimrod success, and in some cases had dangerous circumstances. The record of political battles, wartime studies, and various other written accounts leave confusing and contradictory reports of A-26A operations. The aftermath of the political battle over the Nimrod conceals an outstanding combat record and unexploited potential for further success.

⁹⁴ Quoted in Trest, 219.

⁹⁵ William W. Momyer, *Airpower in Three Wars* (Washington: Department of the Air Force, 1978), 204-205.

CHAPTER 3

CORRECTING THE RECORD: A COMPREHENSIVE EVALUATION

“The 609th Special Operations Squadron, a one of a kind outfit, produced BDA [bomb damage assessment] under conditions where our more sophisticated systems were stymied. . . They literally ‘wrote the book’ on how to kill trucks at night and in the most hostile AAA environment we have encountered.”

-Brigadier General Wendell L. Bevan, Jr.
7th Air Force Director of Combat Operations⁹⁶

Earlier reports on the A-26A fell short of a comprehensive evaluation of the aircraft's qualities and combat results. The evaluations completed during the war relied on rigorous quantitative data on the aircraft's truck killing results. At their conclusion these reports stated that the A-26A and other propeller driven aircraft were too vulnerable to AAA, with few references to numerical data justifying the conclusion. In official communications, Mommyer and others made inaccurate generalizations about the A-26A, like its high maintenance costs. To conduct a comprehensive evaluation of the aircraft's tactical and strategic importance it is necessary to devise a framework with ordered categories. To be tactically successful a ground attack aircraft must be able to find a target, destroy it, and survive the environment. In evaluating strategic importance, an

⁹⁶ Wendell L. Bevan, Jr. to 56th SOW, File K-WG-56-HI JUL-SEP 69 V.2, AFHRA, Maxwell AFB. This letter was sent to the 609th SOS shortly before its deactivation in November 1969.

aircraft must be able to do 'something operationally significant and survive.'⁹⁷ The following framework is an example of how 7th Air Force and others might and perhaps should have judged the A-26A and a method for historical explanation and evaluation of the Nimrod's success.

A tactical analysis of the ground attack aircraft evaluates the airplane's effectiveness at performing the mission. In this case, the preponderance of A-26A sorties were directed against trucks at night, and the official studies completed during the war evaluated the aircraft in this role. In order to correct the misconceptions of previous studies and focus on the aircraft's major role this evaluation will also focus on the Nimrod's truck killing effectiveness. Upon appraising the A-26A's qualities and ability to operate in the Laotian environment, it is clear the Nimrod was ideal for the night interdiction role.

Ease of target acquisition is one of the most important categories for assessing an attack aircraft's tactical effectiveness. Armed reconnaissance against targets of opportunity was the technical term for the Nimrod's mission, and it fit. An obvious but essential precondition to hitting a target of opportunity was to visually acquire it. This was no small feat in the harsh Laotian environment. The Ho Chi Minh trail was covered by triple canopy jungle and wound through the valleys of the Annam Mountain Range. Add to these factors the darkness of night and the mission became especially difficult.

⁹⁷ John F. Guilmartin, Jr., *Criteria for Evaluating Aircraft Combat Effectiveness: An Analytical Framework for Historical Analysis*, (Ohio State University: unpublished manuscript, 2001), 1. Guilmartin developed this framework for evaluating bombers and fighters. My framework is adjusted to evaluate a ground attack aircraft. Some of the categories for analysis are borrowed from Guilmartin's manuscript, but they are justified and explained in different ways because of the difference in aircraft mission.

However, the A-26A was well equipped to identify targets in this environment with many advantages over jet aircraft.

The configuration of the aircraft played a major role in the ease of target acquisition. The pilot and navigator sat side by side in the cockpit, so one set of eyes was always on the trail looking for trucks. The F-4 was a two seat aircraft as well. However, the second crewmember sat behind the first, so he really couldn't see to help acquire the target. The F-105 had no second crewmember at all. In the more immediate circumstances of the attack run-in, the extra crewmember was critical. According to standard procedure the navigator monitored the instruments for minimum airspeeds, altitudes, bank angle, and dive angle while the pilot kept his eye on the target, ensuring that the munitions hit the truck.⁹⁸

The aircraft's low speed was an added advantage. The slower speed allowed the crew members to thoroughly scan each passing area of the trail. The pilot had plenty of time to visually acquire the target on attack run-ins.⁹⁹ In comparison, jet aircraft made high speed diving attacks at 350 to 500 knots with only seconds to acquire the target before dropping munitions.¹⁰⁰

Wickstrom and Galuzzi's innovation with the starlight scope in the A-26 proved to be a major advantage. The third crewmember could identify targets quickly with the scope so that the aircraft could immediately drop flares and circle back for an attack. During Aderholt's tenure as commander of the 56th ACW the wing spotted 3514 targets.

⁹⁸ Nolan W. Schmidt, e-mail to author, April 11, 2001.

⁹⁹ Trest, *Air Commando One*, 195.

¹⁰⁰ Barry D. Watts, *Unreported History and Unit Effectiveness*, unpublished manuscript, 2.

Of these sightings, 3131 (90%) were made with the starlight scope.¹⁰¹ Although not all of those were sighted from scopes in A-26As, the figure is a testimony to the effectiveness of the scope in acquiring targets.

Weapons load and effectiveness are equally important criteria for evaluating the tactical importance of the A-26A. Attacking trucks was a tricky business. The North Vietnamese did not just stand still waiting for an American aircraft to drop munitions on them. Weapons had to be able to stop truck convoys from moving and then ensure their complete destruction. The A-26A frequently had to attack trucks that were out of sight, in hiding places. According to the rules of engagement, the truck had to burn to be counted as destroyed. The A-26A could carry a wide variety of munitions and had the tactical flexibility to employ almost anything effectively.

Overall, the A-26 had a superior weapons carrying capability. The fifty caliber machine guns each had an ammunition box capable of carrying 350 rounds. With 8 guns, the aircraft had a 2800 round capacity, which amounted to 15 to 20 seconds worth of firing time. The aircraft had eight pylons under the wing and 12 bomb bay stations. In total, the aircraft could carry up to 10,000 lbs of conventional munitions in various configurations. Typically they carried flares on the outer wing pylons, leaving the inner six pylons for CBU's, napalm, or fragmentation bombs. The bomb bay typically carried a mix of 750 lb fragmentation bombs and Mk 31/32 incendiary cluster bombs.¹⁰² With a full load the aircraft could make 20 to 25 bomb and gun passes.¹⁰³

¹⁰¹ Aderholt, End of Tour Report.

¹⁰² *Aircrew Weapons Delivery Manual, USAF Series A-26A*, 1-6.

¹⁰³ Paul Marschalk, e-mail to author, April 12, 2001.

The first and most challenging phase of any attack was to stop trucks from moving farther down the trail, holding them in position for further attacks. The aircraft carried a variety of weapons capable of accomplishing this feat. By far their favorite was the Mk 31/32 incendiary cluster bomb. As described earlier, the 'funny bomb' had an area coverage that could stop a large grouping of trucks. The next best weapon was napalm. Although, napalm did not have the same area coverage as a funny bomb, it was equally effective in stopping a convoy.¹⁰⁴ In addition to their stopping power, these weapons were highly effective at burning trucks, ensuring that the truck was destroyed according to the rules of engagement.

The next phase of the attack involved destroying the remaining trucks that backed up on the road. In this phase the eight .50 caliber machine guns were the most accurate and effective weapon. The aircraft made a diving attack and fired a short burst, typically 3 seconds. Major Frank Gorski stated, "You got anything in that pippet [the aiming dot projected on the reflective gun sight] and squeezed down, it went. I've seen trucks just fall apart."¹⁰⁵ In some cases it was tough to get a truck to count as a kill. The diesel fuel in the trucks was difficult to ignite. Often a pilot could knock a truck over and riddle it with bullets but it wouldn't burn. In these cases the truck counted as damaged but not destroyed according to the rules of engagement.¹⁰⁶

The 56th ACW did suffer periodically from ordnance shortages that made noticeable but not critical differences in combat results. As discussed earlier, funny

¹⁰⁴ Chinnery, 147-148.

¹⁰⁵ Frank L. Gorski, interview by V. H. Gallacher and Lyn R. Officer, USAF Oral History Program, File K239.0512-650, AFHRA, Maxwell AFB.

¹⁰⁶ Kittinger, USAF Oral History Interview.

bombs and napalm were in particularly short supply. For example at the beginning of December 1967 the wing ran out of funny bombs. Truck kills dropped to 264 for the month from 324 the previous month.¹⁰⁷ However, aircrews repeatedly stated that ordnance supply was not a problem. Colonel Kittinger stated, "Normally there was something you could fall back on and use. You can change your tactics and use what's available."¹⁰⁸ Lieutenant Colonel Bonwit, an A-26 navigator, stated, "We always had some kind of munitions. We may not have liked it but we could use it and we always had a full load."¹⁰⁹ The difference in kills during ordnance shortages was evidence of both the importance of ordnance carried for a ground attack aircraft and the importance of tactical flexibility.

Aircraft handling and performance characteristics are another critical criteria in evaluating a ground attack aircraft. In addition to carrying an adequate number and appropriate type of weapon the aircraft must also be able to deliver it accurately. This category considers two factors- the aircraft's ability to maneuver for effective weapons delivery and the ease with which pilots could learn and perform these maneuvers. The A-26A had few limitations in weapons delivery and proved to be much better than jet aircraft.

The A-26A was well suited for low-level attack. The aircraft had the advantage of low wing loading, which permitted the Nimrod to deliver unguided weapons at shorter ranges. This raised the chances of an accurate hit on the target. In contrast, jet aircraft had high wing loading, requiring them to start and recover their attack dives at higher

¹⁰⁷ *History of the 56th ACW*, File K-WG-56-HI Oct-Dec 1967, AFHRA, Maxwell AFB, 20.

¹⁰⁸ Kittinger, USAF Oral History Interview.

¹⁰⁹ Bonwit, USAF Oral History Interview.

altitudes. The higher recovery altitude, typically about 5,000 ft AGL, made it difficult for jets to deliver weapons on a pinpoint target like a truck as accurately as propeller driven aircraft.¹¹⁰ Because of the higher load on the jet's wing the pilot could not easily make fine adjustments to their attack dive to ensure a hit on the target. This limitation also played into the difficulty of target acquisition for jet pilots, as they were farther away and had to acquire the target from a greater distance.

The A-26 had the added advantage of a long loiter time. The aircraft's reciprocating engines were custom built for efficient fuel consumption at low altitudes. By contrast, jet engines are notoriously fuel-inefficient at low altitude. Aided by the close proximity of Nakhon Phanom to the Trail, Nimrods could orbit over the target area for up to 3 hours. Missions in the Barrel Roll area frequently went up to 4 hours, including the 90 minute trip there and back. Aircrews consistently stated that part of the mission was just being over the trail. During a jet attack AAA gunners and truck drivers alike knew that if they hid for 15 or 20 minutes the danger would pass.¹¹¹ This was not so with the A-26. Major Gorski stated, "As soon as you fly out of sight, they start moving again... But the fact that you're there made everything stop, you've effectively stopped the supply system while you're present."¹¹² Aircrew familiarity with the trail was a direct consequence of the aircraft's long loiter time. Pilots and navigators knew likely spots for target concentration and hiding places. Although a long loiter time is not an absolutely essential characteristic for an attack aircraft, this performance advantage clearly enhanced the Nimrod's effectiveness.

¹¹⁰ Aderholt, End of Tour Report.

¹¹¹ Bonwit, USAF Oral History Interview.

¹¹² Gorski, USAF Oral History Interview.

Aircrews all had positive things to say about the general handling characteristics of the A-26. Pilots consistently stated that the A-26 had few limitations for ordnance delivery. Lieutenant Colonel Schultz, squadron commander of the 609th, stated, "Contrary to most beliefs the (A-26) was fully aerobatic. It would perform maneuvers no other plane could perform."¹¹³ Colonel Kittinger stated, "It was a very honest aircraft with no quirks."¹¹⁴ Nolan Schmidt, an A-26 navigator stated, "I've flown 100 C-130 combat support sorties and over 100 F-4 missions (many over Route Package VI during Linebacker) and my comfort level in the A-26 was as high or higher than any other of my combat experiences."¹¹⁵

It was also relatively easy to learn to fly the A-26. Volunteers with previous flying experience in other aircraft filled all of the A-26 cockpits. The aircraft had different challenges based on the pilot's previous experience. Pilots coming from transport aircraft found the basic handling of a tricycle gear aircraft with reciprocating engines an easy adjustment. Their difficulty came with learning the quirks of weapons delivery and figuring out how to adjust the aircraft attitude based on the attack conditions. Pilots with previous attack experience adjusted quickly to the Nimrod's combat tactics and spent more time learning the ins and outs of a large propeller driven aircraft.¹¹⁶ Paul Marschalk said, "the learning curve was short and steep and... the aircraft created eager learners."¹¹⁷

¹¹³ Schultz quoted in Hagedorn and Hellstrom, 165.

¹¹⁴ Joe Kittinger, e-mail to author, April 12, 2001. Kittinger's comments on this point though brief are particularly poignant. He was an experimental test pilot prior to his combat tour in the A-26, and he is currently a fellow in the Society of Experimental Test Pilots.

¹¹⁵ Nolan W. Schmidt, e-mail to author, April 11, 2001.

¹¹⁶ George Matthews, interview by author, April 11, 2001.

¹¹⁷ Paul Marschalk, e-mail to author, April 12, 2001.

The number of truck kills was the ultimate measure of target acquisition, weapons effectiveness, and handling characteristics. The synergistic effect of these three criteria produced extraordinary results for the A-26A. The numbers from the previous studies speak for themselves. The three studies completed during the war all agree that the A-26A and other propeller driven aircraft were much more effective in destroying or damaging trucks. Although the studies use different sources and different formulas, they all come up with the same bottom line answer. The propeller driven aircraft was either 10, 3, or 2 times better than the jet at killing trucks.

Vulnerability to battle damage is a highly important criteria for any ground attack aircraft. If an airplane cannot survive the environment in which that target exists, it does not matter how well it attacks the target. The AC-47 was a very good weapon system for hitting trucks, but it had to be pulled out of the Thailand because of casualties to AAA. The A-26A, on the other hand, performed remarkably well in the face of the AAA threat, contrary to the assertions of 7th Air Force and other opponents.

The biggest justification for removal of the A-26A was high casualty rate due to AAA, but the evidence doesn't exist for this assertion. Opponents of the Nimrod liked to point out the aircraft suffered a 40% casualty rate because of AAA. This statistic is extremely misleading. First, the Air Force lost only 12 Nimrods in Southeast Asia, which is not a horrendous casualty figure compared to the numbers of other aircraft shot down over Laos (see appendix E). The casualty rate is so high because there were a low number of Nimrods deployed to Southeast Asia. Of the 12 A-26s shot down only 5 of the casualties were directly related to AAA hits (see appendix C). Frank Gorski pointed out,

‘If the AAA was as effective as it supposedly was everyone of them (A-26s) would have been wiped out.’¹¹⁸

An analysis of the aircraft’s maneuverability and performance reveals advantages and disadvantages in its vulnerability to battle damage. The aircraft’s maneuverability and low wing loading allowed pilots to jink the aircraft on attack runs, that is to maneuver erratically, turning the nose in a different direction than the aircraft was flying to confuse gunners as to which way the aircraft was going. Lt Col Bonwit compared the motion to a falling leaf.¹¹⁹ In general, pilots tried to vary the run-in heading to avoid predictability and observe the gunfire pattern to pick the best escape route on the pull out.¹²⁰ However, the aircraft had a relatively slow airspeed giving gunners more time to get bullets on target. The aircraft was most vulnerable to AAA on the climb out from an attack dive when it was at low altitude with low airspeed. Pilots frequently had to escape at tree top level and climb out later to dodge bullets.¹²¹

In the event of an AAA hit the aircraft had a tough construction that could absorb extensive battle damage. Pilots consistently described the aircraft as a ‘tough ole bird.’ Joe Kittinger described a sortie on which his A-26A took major battle damage and made a successful “night, no radio, no hydraulics, no brake landing” at Ubon RTAFB.¹²² The Nimrod’s most vulnerable spots were underneath the aircraft in the nose-wheel area and the cockpit. After a navigator was nearly hit by small arms fire from beneath the aircraft, maintenance personnel installed steel plating under the seats to protect the aircrews. The

¹¹⁸ Gorski, USAF Oral History Interview.

¹¹⁹ Bonwit, USAF Oral History Interview.

¹²⁰ *AFLC Tactics Manual, A-26A.*

¹²¹ George Matthews, interview by author, April 11, 2001.

¹²² Kittinger, e-mail to author, April 12, 2001.

aircraft was equipped with self sealing fuel tanks in the wings, and the engines were relatively invulnerable to bullets. George Matthews, an A-26 pilot, stated, "We frequently came back with bullets imbedded in the cooling fins of the cylinders, and the engines continued to run." He went on to describe the engines as good armor for the vulnerable position in the cockpit.¹²³

The A-26's critical weakness in dealing with battle damage was aircrew survivability. The aircraft did not have an ejection system. Escape in emergency situations was a harrowing experience. The aircrew had to climb out of the top of the cockpit and jump trying to avoid the propellers and the vertical stabilizer on the way out. Most aircraft that took critical damage were in low airspeed and low altitude situations, so escape was next to impossible. In early 1969, the Air Force Modification Review Board evaluated the A-26 for installation of the Yankee ejection seat system, which extracted the crew member from the aircraft by means of a nylon lanyard attached to a rocket.¹²⁴ The system was designed for employment in aircraft without a pre-existing ejection seat, and the Yankee system had a high degree of success in previous and subsequent programs. It was particularly successful in the A-1.¹²⁵ The study stated that the Yankee system could have worked in the Nimrod. However the study concluded that it would be wasteful since there were so few Nimrods, and they pulled the aircraft from

¹²³ George Matthews, interview by author, April 11, 2001.

¹²⁴ *History of the 56th SOW*, File K-WG-56-HI Apr-Jun 1969, V.1, AFHRA, Maxwell AFB, 64.

¹²⁵ John F. Guilmartin, Jr., in conversation April 12, 2001. Guilmartin studied the Yankee ejection seat system in detail while working on the history of the space shuttle program and testifies to its effectiveness. Unlike conventional ejection seats, the Yankee system required no major airframe modifications.

combat instead of installing the system.¹²⁶ Consequently, a lost aircraft most often meant a lost aircrew.

Vulnerability to detection is a closely related category to battle damage vulnerability, but the criteria are distinct. Vulnerability to detection evaluates an aircraft's ability to avoid detection by enemy defenses, while vulnerability to battle damage evaluates the aircraft's reaction once it is detected. Early in the aircraft's deployment A-26A crews could easily deal with detection problems. However, it was the Nimrod's weakness in this category that most reasonably justified its withdrawal in 1969.

The A-26A was certainly vulnerable to aural detection. Enemy gun crews heard the engines of the aircraft and knew to prepare for an attack. However difficulties associated with relying solely on aural detection worked to the A-26A's advantage. Since the gun crews frequently couldn't see the aircraft they tried to aim their guns by following the sound of the aircraft. This caused them to undershoot. Pilots also tried to fool enemy gunners by flying low over the trail and then jumping up to a higher altitude while putting the propellers out of synch. Gene Albee, a Nimrod pilot, stated, "It was a pretty good tactic. They couldn't tell where the airplane was. . . Lots of times, they'd start shooting at where they thought the noise was, and in all probability it would be the wrong place."¹²⁷ This tactic gave A-26 crews the advantage of knowing the location and radius of an AAA emplacement before they commenced an attack.

The A-26 was only vulnerable to visual detection under certain circumstances. Nimrods operated with a blacked out cockpit, with barely enough light to see the

¹²⁶ *History of the 56th SOW*, Apr-Jun 1969, 64.

¹²⁷ Quoted in Kelly, 197.

instruments. In addition, the aircraft had a small silhouette for its weight from head on and from the side, with the exception of the vertical stabilizer (see appendix A). The A-26 had a lot of exposed surface area from directly above and below, positions that AAA fire usually could not attack.¹²⁸ The aircraft was vulnerable to visual detection when back-lighted by flares or moonlight. To avoid being silhouetted by flares pilots waited until the flares fell to a low level before making the attack run. They could also use ground mark flares to avoid the dangers of aerial flares. There wasn't a reliable tactic to avoid silhouetting from moonlight, except to rely on flak suppression and the aircraft's other advantages.¹²⁹

The number and sophistication of anti-aircraft weapons in Laos by the end of 1969 negated any advantages the A-26A had in avoiding or absorbing AAA fire. After Johnson's bombing halt in 1968 the Air Force increased the number of jet sorties in Laos. Since there was no longer a threat in North Vietnam and the preponderance of air targets were in Laos, the NVA increased the number of weapons in Laos (see Table 2 below). During the wet season of 1969 the NVA also moved radar-guided 23mm and 37mm guns into the panhandle. The AAA in Laos by the end of 1969 made the environment virtually unsurvivable for the A-26. With a great number of guns in the area, the North Vietnamese did not have to be good shots because the volume of fire created a virtual barrier of bullets. In addition, the A-26A had no method for jamming or escaping radar guided AAA.

¹²⁸ Paul Marschalk, e-mail to author, April 12, 2001.

¹²⁹ Ibid.

1 Apr 68	1 Nov 68	31 Dec 68	1 Feb 69	15 Mar 69	1 Jul 69
123	229	324	559	490	516

Table 2: Enemy AAA Guns (Photo Confirmed) in Steel Tiger Area of Laos
Source: *Relative Efficiency of F-4, A-1, and A-26 Aircraft Attacking Trucks in Laos*, OASD/SA and AFXDC, K143.042-31, AFHRA, Maxwell AFB.

Although the A-26A itself was vulnerable to AAA fire after 1969, the Air Force had options to solve the problem. In subsequent operations with the AC-130 gunship, the Air Force successfully employed F-4s for flak suppressions while the gunships conducted attacks against this same area of the Ho Chi Minh Trail. The Air Force could have feasibly used similar tactics with the A-26A to continue exploiting its tactical effectiveness while compensating for its weakness to AAA attack.

The human dimension of A-26A operations is a critical factor for explaining their success. This category does not figure into a technical examination of what made the A-26 successful, and it does not figure into the decision making process on retaining the A-26 in Southeast Asia. However, from a historical standpoint this category is an essential area of investigation for explaining how the A-26 compiled such an impressive record.

All of the aircrews in the 609th were volunteers, a major factor contributing to their success. They wanted to be in Southeast Asia flying the A-26A. The aircrews worked together as a team and had a high level of pride and esprit de corps. Several aircrews with previous or later experience in other combat tours of Southeast Asia testified to the difference between the 609th and other squadrons. Joe Kittinger, who compared the 609th to his later experience in F-4s, said, "You had a different breed of cat.

You had a guy that was there because he wanted to be there; you had a guy there because he was motivated; he was proud of his outfit, proud of the unit... Try as you may, it's difficult to get that except in all volunteer outfits."¹³⁰

The nature of the training completed by A-26A crews was also a major factor contributing to the Nimrod's success. Working at night took special skills. Aircrews needed experience with different visual cues and flying dangers inherent to working at night. The aircrews completed realistic training sorties approximating actual combat conditions. The Air Commando training philosophy was that it was better to lose an aircrew in realistic training than to lose one in combat because they didn't know what they were doing, which was quite the opposite of the concurrent philosophy in Tactical Air Command (TAC).¹³¹ In describing the difference between Nimrod crews and jets Aderholt flatly stated, "our A-26 crews were more proficient-- much more proficient."¹³² Kittinger said, "We could hit more accurately than jets because we did it day in and day out."¹³³

The high degree of pilot-navigator trust and coordination was another factor contributing to Nimrod success. Navigators frequently functioned more as co-pilots in the A-26A. Crew members worked together and relied on one another to keep the aircraft in a safe flying condition and ensure accurate weapons delivery. Describing crewmember coordination, Nolan Schmidt said, "I knew what he wanted, and he didn't

¹³⁰ Kittinger, USAF Oral History Interview.

¹³¹ Bonwit, USAF Oral History Interview.

¹³² Harry C. Aderholt, interview by Samuel E. Riddlebarger, USAF Oral History Interview, File K239.0512-249, AFHRA, Maxwell AFB, 88.

¹³³ Kittinger, USAF Oral History Interview.

have to ask if we were properly configured.”¹³⁴ They knew each other’s every move and sentiment often with out verbal communication. During an attack run the navigator would hit the pilot on the arm over a certain bank angle, dive angle, below altitude, or airspeed. The pilot could tell how much to correct by the severity of the swat.¹³⁵

A critical factor contributing to A-26A success was the dedication of maintenance crews. Nimrod aircrews repeatedly credit their success to maintenance personnel who kept the airplanes flying. During the Nimrods’ attacks at Khe Sanh, maintenance crews worked 72 hours straight.¹³⁶ Frequently because of shortages in maintenance personnel crews worked 12 hour shifts 6 days a week.¹³⁷ Joe Kittinger stated, “Without the superior efforts that our maintenance troops put out nothing would have flown.”¹³⁸

The overall perseverance of the 609th under adverse conditions is remarkable. These men were the most successful squadron at the interdiction mission in all of Laos, but they received little recognition from higher headquarters. Aircrews frequently got decorations but seldom when they performed really valorous acts. George Matthews received a silver star for a sortie on which he destroyed a high number of trucks, certainly an admirable accomplishment. He stated that aircrews frequently stayed over the target area longer than they should have, making repeated passes under heavy fire. In describing one such sortie, Matthews said, “We barely made it back to base. Then we got nothing but chewed out.” When 7th Air Force officials found out about this sortie they

¹³⁴ Nolan W. Schmidt, e-mail to author, April 11, 2001.

¹³⁵ Ibid.

¹³⁶ Jim Galuzzi, interview by author, April 12, 2001.

¹³⁷ *History of the 609th ACS*, K-WG-56-HI, Oct-Dec 1967 V.1, AFHRA, Maxwell AFB.

¹³⁸ Joe Kittinger, e-mail to author, April 16, 2001.

tried to ground him for violating the 6 weapons pass regulation that was in effect.¹³⁹ No one acknowledged the operational success or individual courage of these airmen, but they continued their exceptional performance.

In summary, the A-26A was clearly a tactically efficient aircraft between 1966 and 1969. The aircraft's design and performance characteristics were ideal for the night interdiction mission over Laos. The aircraft was not impervious. To be sure, it had some critical weaknesses to battle damage in an environment of concentrated enemy defenses. The wartime studies on the aircraft were correct in their argument on the aircraft's weakness to AAA, but they failed in estimating the magnitude of the weakness and just what kind of environment would preclude A-26A operations. In the absence of major changes in operational practice and modifications to the A-26A the Air Force was justified in withdrawing the aircraft from Southeast Asia in 1969. The Air Force did have options to compensate for the Nimrod's shortcomings and continue to exploit the aircraft's prowess as a truck killer. However, the Air Force senior leadership refused to institute these changes because the modifications were contrary to their political agenda.

A separate set of variables define a ground attack aircraft's strategic effectiveness. As previously stated, the aircraft must do something operationally significant and survive. A strategic analysis considers the broader implications of an aircraft's tactical success and vulnerability along with factors that define the magnitude of the aircraft's effort. In the case of the A-26 one must consider the importance of the number of trucks killed and the general importance of the act of killing trucks to the overall air effort. The

¹³⁹ George Matthews, interview by author, April 11, 2001.

analysis also considers factors defining the cost and availability of aircraft for operations. Together these factors define the A-26A's ability to accomplish a strategically significant task.

The first and most important factor defining strategic effectiveness is the operational significance of the aircraft's tactical success. To assess operational significance one must first examine the Air Force's goals and how the A-26A's operations fit into those goals. Next one must look at the intended and unintended effects of Nimrod operations. Using these criteria it is clear that the A-26A played a significant part in the Air Force's operational plan, but the aircraft could have played a much larger role with a greater magnitude of effort.

Nimrod operations directly met two of the Air Force's initial air campaign objectives. The A-26A certainly "reduced the flow and increased the cost of infiltration of men and supplies from North Vietnam to South Vietnam." The A-26A's tactical success also worked to "make it clear to the North Vietnamese leadership that as long as they continued their aggression they would have to pay a price in the North."¹⁴⁰ As Momyer asserted in *Airpower in Three Wars*, air interdiction was the heart of the Air Force's strategy in Vietnam, and the A-26A's ability to kill trucks clearly played a key part in this pursuit.

The high cost inflicted on the North Vietnamese by the A-26A went beyond numbers of trucks destroyed. The interdiction effort led by the Nimrod diverted a great deal of manpower and material resources into Laos that could have accomplished other productive tasks. The North Vietnamese established Group 565, a special NVA unit for

¹⁴⁰ Momyer, 173.

defending the Ho Chi Minh trail. Group 565 manned 25,000 checkpoints and artillery positions. The North Vietnamese also employed a force of 50,000 coolies, with nominal salaries, for repairing damaged trucks and sections of Trail.¹⁴¹ Nimrods, along with other aircraft operating against the Trail, forced the North Vietnamese to expend a great deal of effort in moving supplies down the Trail. They had to take elaborate, time-consuming steps to hide roads, storage areas, and truck parks.¹⁴² Aderholt asserted, "The great increase in caliber and number of enemy anti-aircraft weapons along the infiltration trails in Laos is testimony to the effectiveness of the A-26A operations."¹⁴³ In addition to inflicting a direct cost by destroying enemy trucks, Nimrods inflicted an opportunity cost by diverting North Vietnamese effort from industry in the North or direct action against ground forces.

Despite their success in inflicting an increased cost on the North Vietnamese, the A-26As failed at significantly denting the flow of enemy supplies to the battlefield. According to definition air interdiction is "the systematic attack of an enemy's logistic network for the purpose of destroying, neutralizing, or delaying his military potential before it can be brought to bear effectively against friendly ground forces." The Air Force had few illusions about completely cutting off the flow of supplies to South Vietnam, but they did want to impede the flow significantly enough to impact North Vietnamese operations. Since we may never know the North Vietnamese campaign

¹⁴¹ Christopher Robbins, *The Ravens, The Men Who Flew in America's Secret War in Laos* (New York: Crown Publishers, Inc., 1987), 289-290.

¹⁴² C. William Thorndale, *Interdiction in Southeast Asia, November 1966- October 1968*, HQ PACAF, Project CHECO, File K717.0414-11, AFHRA, Maxwell AFB, 120.

¹⁴³ Aderholt, End of Tour Report, C-3.

plans, relative success at achieving this objective is difficult to judge.¹⁴⁴ However, the numbers on what did get through are significant. During 1967 the 56th ACW sighted 3,514 vehicles on the Ho Chi Minh Trail, but aircraft attacked only 1,834.¹⁴⁵ In his end of tour report Aderholt stated that the year's interdiction effort was a failure. He pointed out that many more trucks escaped than expressed in this figure because the wing did not have sufficient aircraft to conduct 24-hour surveillance and combat operations.¹⁴⁶ The A-26 posted higher numbers of trucks destroyed in subsequent years. However, in those following years the North Vietnamese increased the number of trucks pushed down the Trail, and in proportion the number of truck kills did not increase. The low number of trucks attacked had nothing to do with the A-26's proficiency and everything to do with the low number of them deployed to Southeast Asia.

In addition to its importance to tactical effectiveness, the A-26A's handling characteristics figure into an analysis of its strategic effectiveness. In terms of strategic effectiveness the handling characteristics are important because they define how many pilots can be trained to fly the aircraft. If an aircraft is especially difficult to fly then a nation cannot put just any one in the cockpit, and the numbers of aircraft available for operations are low. The handling characteristics of the A-26A did not have a negative impact on the number of aircrews available for combat. Aided by their previous flying experience, pilots and navigators repeatedly reported that the aircraft was easy to learn.

¹⁴⁴ Herman L. Gilster, *The Air War in Southeast Asia, Case Studies in Selected Campaigns* (Maxwell AFB: Air University Press, 1997), 7-8.

¹⁴⁵ Aderholt, End of Tour Report, D-1.

¹⁴⁶ *Ibid.*, 2.

Few if any aircrews flunked out of Nimrod training.¹⁴⁷ If the aircraft were employed on a larger scale, the Air Force could have easily filtered numerous aircrews successfully through A-26 training.

Aircraft produceability is a critical factor in defining the volume of effort contributed by an aircraft. If an aircraft's tactical effectiveness is going to produce a concurrent strategic impact the Air Force must possess a large number of planes to multiply and exploit the advantage. The A-26A was certainly a producible aircraft. The airplane cost only \$350,000 a piece to convert from the old B-26B model.¹⁴⁸ This is a low figure considering the multi-million dollar price tag on each jet. The number of B-26Bs available for conversion was not an issue either. In 1963 On Mark had their choice of over 300 B-26Bs in storage at Davis Monthan AFB. An adequate number of Invaders remained in storage that were in sufficient condition to be rebuilt and fielded in Southeast Asia. In the initial rebuild, On Mark turned out roughly one aircraft every week, an impressive figure for a small engineering company.¹⁴⁹ The small number of existing Nimrods was not a factor of an elaborate or expensive production process; it was simply a factor of how many the Air Force chose to purchase.

Maintainability is another important factor determining the volume of aircraft available to make a strategic impact. An aircraft with chronic maintenance problems will constantly be in the repair shop instead of over the battlefield inflicting combat damage. Aircraft with chronic maintenance problems also increase the monetary cost of

¹⁴⁷ Kittinger, e-mail to author, April 12, 2001.

¹⁴⁸ Hagedorn and Hellstrom, 156.

¹⁴⁹ Jim Bell to Denny Lynch, letter of March 18, 1988. Bell was an employee of On Mark during the rebuild on the B-26B. His letter details the process and significant facts about the conversion.

operations. The A-26A certainly had its fair share of maintenance problems, but the Nimrod held up remarkably well for a World War II vintage airframe, with little impact on operations tempo.

The A-26A's number one maintenance problem was parts availability. Because of the aircraft's age, parts for the aircraft were constantly in short supply. Maintenance crews had several methods for dealing with the chronic shortage of parts. First, they frequently used back channel connections to get the parts they needed. During the early days of the Nimrod deployment the aircraft engines had a problem with the spark plugs, which were not designed to operate in the humid environment of Thailand. Jim Galuzzi, the maintenance officer, knew a fellow maintenance officer with the particular spark plugs that he needed. He acquired them directly from his colleague, instead of requesting them through official channels. Under the table deals like this one were a reliable method of acquiring parts while avoiding red tape.¹⁵⁰ Maintenance crews often improvised parts. In October 1968 the A-26A had a problem with cracked landing gear axles. The initial fix for the problem was to use a magnaflux machine on the axles of overstressed aircraft every night. There was only one magnaflux machine at NKP, making it a time-consuming repair, so the crews had to find another solution. They created a sleeve that fit over the axles and added the necessary strength.¹⁵¹ In the last resort crews sacrificed or 'cannibalized' an aircraft, removing the necessary parts from one aircraft to fix the others. Due to coordination between maintenance personnel and the operations staff, cannibalization did not have a critical impact on the number of sorties produced each

¹⁵⁰ Jim Galuzzi, interview by author, April 12, 2001.

¹⁵¹ *History of the 56th SOW*, File K-WG-56-HI, Oct-Dec 68, AFHRA, Maxwell AFB.

night, and the 609th consistently met or exceeded the sortie rate dictated by 7th Air Force.¹⁵²

Part of the A-26A's maintenance problem stemmed from training of repair crews. Airmen who came straight from training to NKP had little experience with reciprocating engines. The bulk of their technical training focused on jet aircraft. With the help of more experienced maintenance personnel the new crews quickly learned the ins and outs of the A-26A.¹⁵³

The 609th lost few aircraft to maintenance related problems. The one accident clearly caused by a maintenance problem occurred on March 11, 1969. During this period the Nimrods had a malfunctioning unsafe gear indicator light. To verify if the gear was down and locked they had to fly the aircraft past the tower until someone could verify that the plane was safe for landing. During the incident in question the aircraft was circling to check the landing gear. While circling, one engine ran out of fuel, and the aircraft rolled into the ground.¹⁵⁴

In comparison to the rest of the Air Force inventory, maintenance on the A-26A was reasonable. The Nimrod's systems were accessible and simple. It did not have complicated radar, electronic, and hydraulic systems like jet aircraft. Maintenance crews on the F-4 had to completely remove the back seat just to fix the radio. The A-26 required between 30 and 40 man-hours of maintenance per flight hour, while the F-4 frequently required up to 60 man-hours of maintenance per flight hour (see Appendix F for a comparison of Operational Readiness Rates). The 609th would have benefited by

¹⁵² Galuzzi, interview by author, April 12, 2001.

¹⁵³ Ibid.

¹⁵⁴ Hagedorn and Hellstrom, 164.

having a few extra aircraft to cannibalize and reduce the stress on maintenance crews to keep the aircraft flying. Maintenance was never an issue in significantly decreasing the number of aircraft available for operations or increasing the cost of Nimrod combat operations.¹⁵⁵

Despite the A-26A's tactical effectiveness throughout its deployment, the Nimrod was not a complete strategic success. Although the A-26A's actions certainly inflicted a measurable cost on the North Vietnamese, the Nimrod failed to have a significant effect on NVA operations in the South because it was not available in sufficient numbers. The A-26's failure was due to no fault of its own. The aircraft demonstrated potential in safely training a high number of aircrews, and it did not create an exorbitant burden due to maintenance problems. The Air Force and On Mark certainly had the capability and resources to produce the A-26A in sufficient numbers. The sole cause of the A-26A's strategic ineffectiveness lies with the Air Force's failure to approve the production and deployment of more aircraft.

¹⁵⁵ Kittinger, e-mail to author, April 13, 2001.

CONCLUSION

"I can condone the United States Air Force lying to the American people... if it protects the force and helps us win. I can't condone the United States Air Force lying to itself until it believes its own lies."
-Colonel Harry C. Aderholt¹⁵⁶

"If you lie about your weapon system you will surely end up with second rate weaponry."
-Colonel Harry C. Aderholt¹⁵⁷

The A-26A's story is fascinating but tragic. In the three years of its deployment to Southeast Asia the Nimrod acquired a matchless record in missions along the Ho Chi Minh Trail. Unfortunately, the Air Force held the aircraft back from being a completely combat effective weapon system. The Air Force missed the opportunity to improve on a highly capable aircraft and in turn increase their overall effectiveness in prosecuting the war.

The A-26A was clearly not predestined to strategic incompetence. The Air Force could have improved the aircraft's effectiveness during its three year tour and extended the aircraft's usefulness past 1969. There are obvious steps that the Air Force should have taken to include giving the A-26A priority for spare parts and munitions. The Air Force could have recognized the aircraft's potential early on and paid for more K model

¹⁵⁶ Quoted in Trest, *Air Commando One*, 213.

¹⁵⁷ Ibid., 210.

conversions. This would have alleviated some of the logistics problems and increased the strategic effectiveness of Nimrod operations against the Trail. Without a doubt, the Air Force should have installed the Yankee ejection seat system in the A-26A. The Air Force needlessly sacrificed the lives of many aircrews that could have survived with the Yankee system in place. It was clear in the post-1969 period that the A-26A would be limited by the increase in AAA, but the heavy defenses did not exist everywhere in Laos. The A-26 could have flown in many areas of the southern panhandle with the aid of jets for flak suppression, and the Barrel Roll area remained a relatively permissive environment. However, considering the deeply seated political reasons behind opposition to the A-26A and other propeller driven aircraft it is unrealistic to expect that the Air Force would take these steps.

The A-26's story is also tragic because the institutional mindsets behind opposition to the Nimrod are representative of trends that brought about the eventual American withdrawal from Southeast Asia. The Air Force was convinced that it could use high technology aircraft to seek out and strike an elusive and persistent enemy. The US could not sacrifice scarce resources to develop an aircraft designed to fight in a 'brush-fire' war like Vietnam. However, jet aircraft had to fly many more sorties to produce the same kinds of results as a low-tech aircraft like the A-26. Operating and maintaining jet aircraft drove the cost of the war higher and higher. The Air Force increased their operational and monetary input for a diminished return. The high cost of the war was one of many underlying issues cited by Nixon for withdrawal from Southeast Asia.

The most tragic part of the A-26A story is that it has slipped through the cracks of the Air Force's institutional memory. Political opposition to the aircraft damaged and suppressed its official record during the Vietnam War and ever since. Although bits and pieces of the Nimrod story exist as chapters in larger works and magazine articles, there has been no large-scale recognition of the 609th's accomplishment. The A-26's story is an Air Force legend that could have been and should have been.

APPENDIX A

Pictures



Figure 1: A-26A at the USAF Museum, Wright Patterson AFB, Ohio



Figure 2: Wing Armament of the A-26A

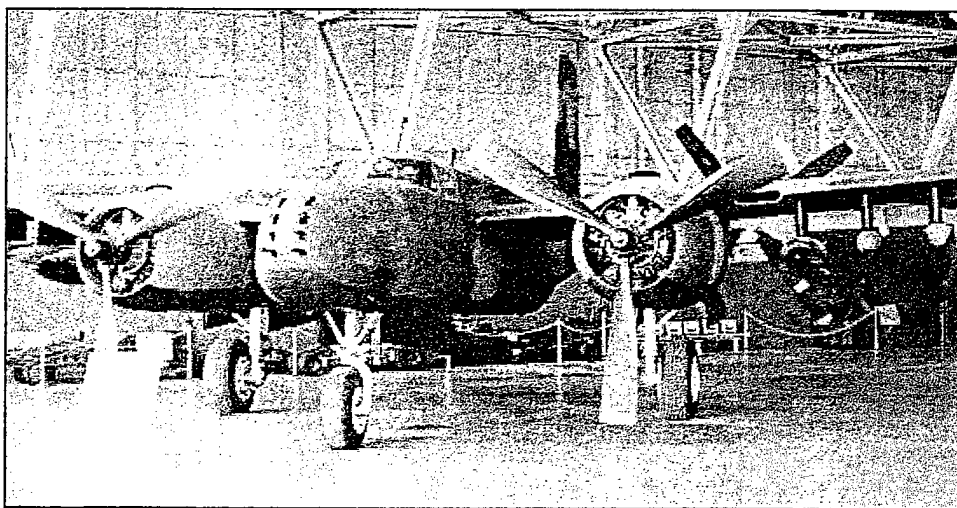


Figure 3: A-26A in the Research and Develop, Flight Test Hangar, Wright Patterson AFB, Ohio

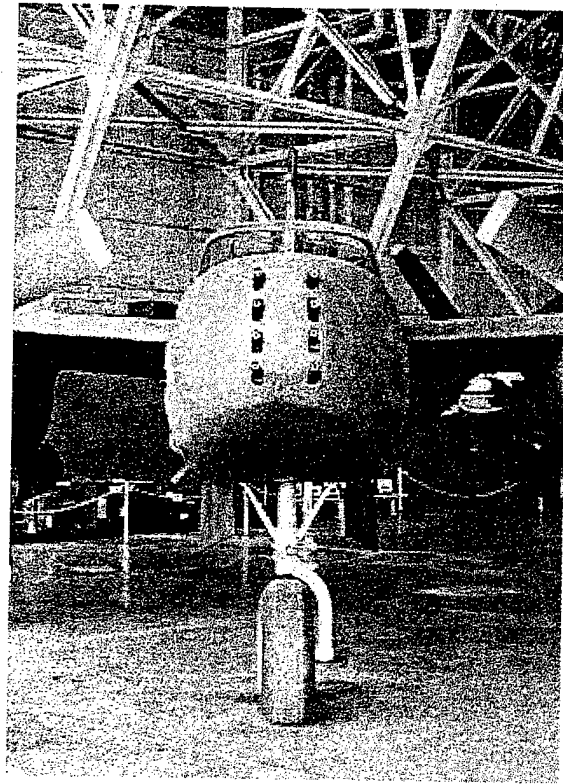


Figure 4: Nose Mounted .50 Caliber Machine Guns

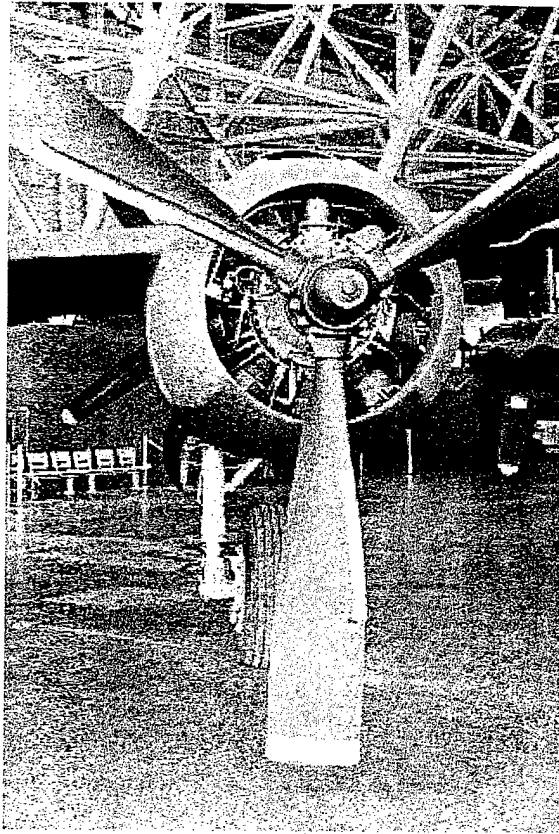


Figure 5: Pratt and Whitney R-2800-52W Engine

Source: <http://www.wpafb.af.mil/museum/annex/an21a.htm>

APPENDIX B

Map of Nimrod Area of Operations

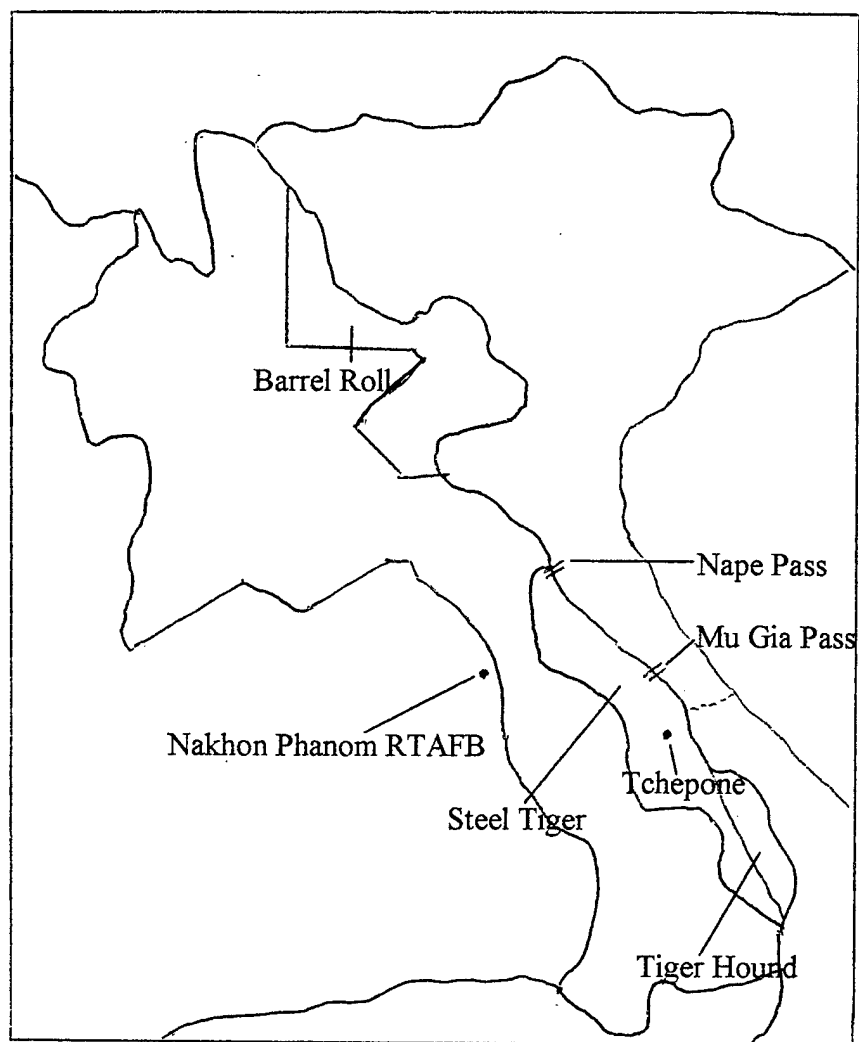


Figure 6: Map of Nimrod Area of Operations

Source: Jacob Van Staaveren, *Interdiction in Southern Laos, 1960-1968* (Washington: Office of Air Force History, 1993), 99.

APPENDIX C

A-26A Individual Aircraft Record

USAF Serial Number	Assigned	Departed/Lost	Remarks
64-17641	3 Nov 67	29 Dec 67	Shot down by AA in Steel Tiger
64-17642	21 Dec 66	27 Aug 67	Missing over northern Laos
64-17643	11 Jun 66	24 Jul 66	Crashed on landing at NKP
64-17644	1 Nov 67	12 Nov 69	To S. Vietnam
64-17645	6 Aug 67	10 Nov 69	To S. Vietnam
64-17646	20 Jul 67	8 Jul 69	Hit the ground on a strafing run in Barrel Roll area
64-17648	30 Oct 67	30 Apr 68	Shot down by AA in Steel Tiger
64-17649	31 May 67	10 Nov 69	Storage
64-17650	11 Jun 66	28 Jun 66	Lost in Steel Tiger
64-17651	24 Oct 67	10 Nov 69	Storage
64-17652	29 Oct 68	10 Nov 69	To S. Vietnam
64-17653	29 Jul 68	13 Nov 69	Storage
64-17654	16 Nov 67	10 Nov 69	To S. Vietnam
64-17660	21 Dec 66	12 Nov 69	Storage
64-17661	3 Nov 67	10 Nov 69	Storage
64-17662	2 Jul 67	22 Aug 67	Missing over northern Laos
64-17664	21 Dec 66	9 Nov 67	Storage
64-17665	11 Jun 66	10 Nov 69	Storage
64-17666	27 Nov 68	10 Nov 69	Preserved at Hurlburt Field, FL
64-17667	11 Jun 66	23 Mar 69	Shot down by AA in Steel Tiger
64-17668	8 Aug 66	22 Feb 67	Abandoned in mid-air near NKP (engine fire caused by AA hit)
64-17669	11 Jun 66	14 Dec 66	Destroyed in mid-air when aircraft blew up
64-17670	29 Nov 68	10 Nov 69	Storage
64-17671	11 Jun 66	10 Nov 69	Storage
64-17672	11 Jun 66	14 Dec 66	Abandoned in mid-air near Thai border (engine fire caused by AA hit)
64-17673	21 Dec 66	11 Mar 69	Crashed at NKP with undercarriage problems
64-17675	21 Dec 66	13 Nov 69	Storage
64-17676	11 Jun 66	3 Aug 67	Storage
64-17677	22 Aug 67	10 Nov 69	To S. Vietnam
64-17678	8 Aug 66	13 Nov 67	Storage

Table 3: A-26A Individual Aircraft Record

Source: Dan Hagedorn and Leif Hellstrom, *Foreign Invaders, The Douglas Invader in Foreign Military and US Clandestine Service* (Leicester: Midland Publishing, 1994), 168.

APPENDIX D

Number of A-26As Deployed to Nakhon Phanom

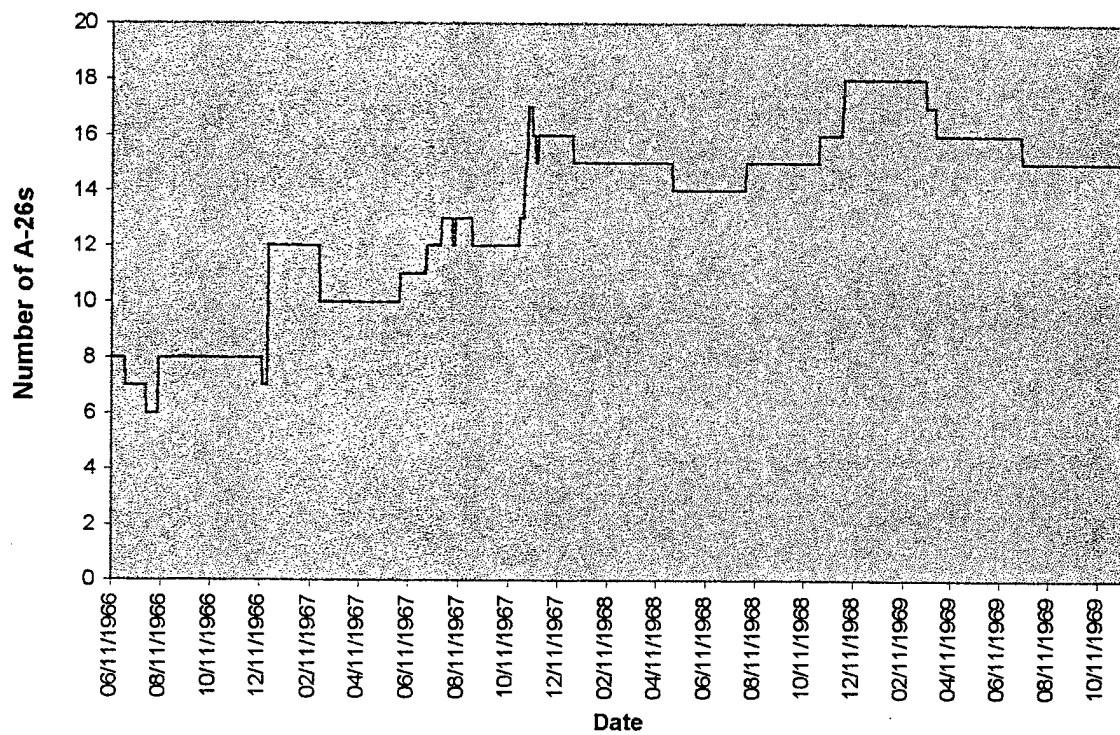


Figure 6: Number of A-26As Deployed to Nakhon Phanom

APPENDIX E

USAF Aircraft Losses in Laos February 1962-February 1968

Aircraft	Number Lost
A-1	29
A-26	7
B-52	0
F-4C	11
F-4D	2
F-105	25
T-28	5

Table 4: Selected Data on USAF Losses Over Laos

Source: Jacob Van Staaveren, *Interdiction in Southern Laos, 1960-1968* (Washington: Center for Air Force History, 1993), 300.

APPENDIX F

A-26A vs. F-4 Operational Readiness Comparison

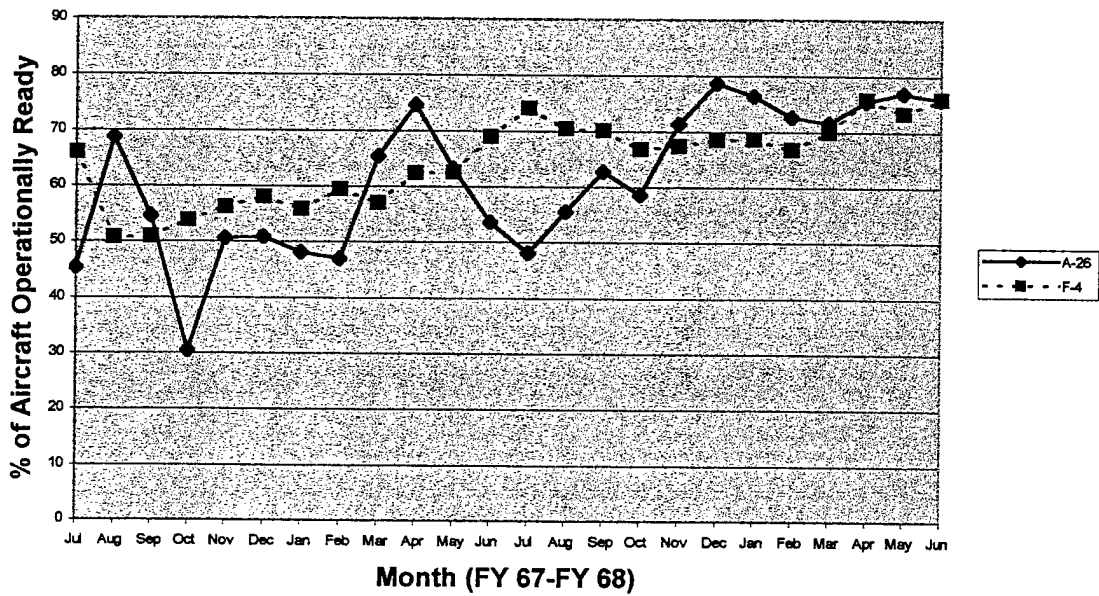


Figure 7: A-26A vs. F-4 Operational Readiness Rates Comparison

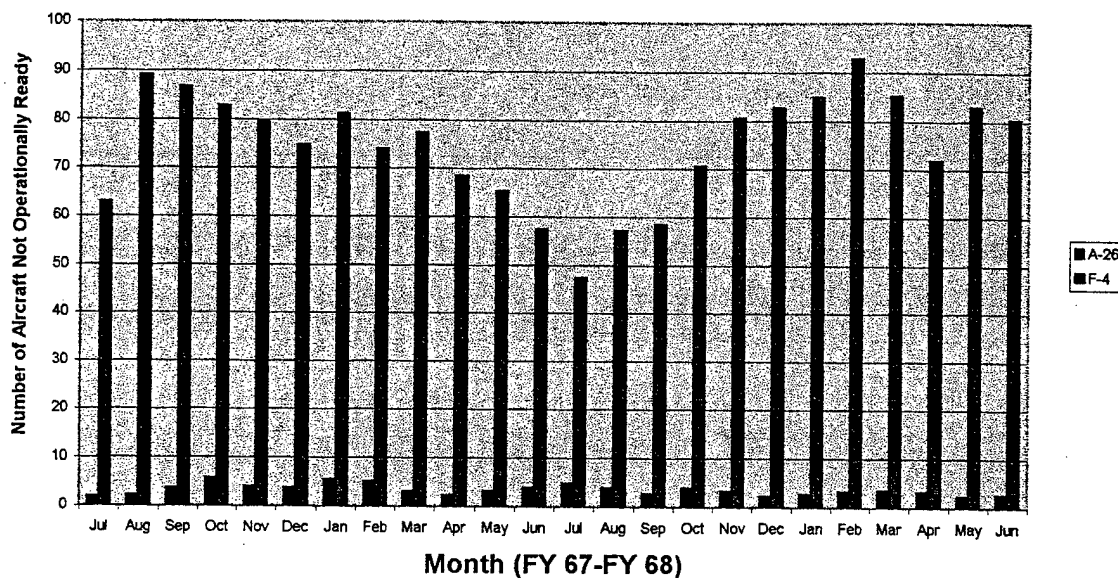


Figure 8: A-26A vs. F-4 Comparison of Number of Aircraft Down
Source: *PACAF Review* (FY 1968 and FY 1969), File K717.197, AFHRA, Maxwell AFB.

It is tough to make a comparison of the relative maintainability of these two aircraft using OR rates. Because there were so few A-26s deployed to Southeast Asia, a single aircraft down meant a big drop in the percent of aircraft operationally ready. The second chart gives a rough idea of what a particular percentage meant in terms of aircraft down.

BIBLIOGRAPHY

Primary Sources-

Unit Histories:

History of the 56th Air Commando Wing (ACW). File K-WG-56-HI, Apr-Jun 1967, Air Force Historical Research Agency (AFHRA), Maxwell Air Force Base (AFB).

History of the 56th ACW. File K-WG-56-HI, Jul-Sep 1967, AFHRA, Maxwell AFB.

History of the 56th ACW. File K-WG-56-HI, Oct-Dec 1967, AFHRA, Maxwell AFB.

History of the 56th ACW. File K-WG-56-HI, Jan-Mar 1968, AFHRA, Maxwell AFB.

History of the 56th ACW. File K-WG-56-HI, Apr-Jun 1968, AFHRA, Maxwell AFB.

History of the 56th Special Operations Wing (SOW). File K-WG-56-HI, Jul-Sep 1968, AFHRA, Maxwell AFB.

History of the 56th SOW. File K-WG-56-HI, Oct-Dec 1968, AFHRA, Maxwell AFB.

History of the 56th SOW. File K-WG-56-HI, Jan-Mar 1969, AFHRA, Maxwell AFB.

History of the 56th SOW. File K-WG-56-HI, Apr-Jun 1969, AFHRA, Maxwell AFB.

History of the 56th SOW. File K-WG-56-HI, Jul-Sep 1969, AFHRA, Maxwell AFB.

History of the 56th SOW. File K-WG-56-HI, Oct-Dec 1969, AFHRA, Maxwell AFB.

Oral Histories:

Aderholt, Harry C. Interview by Hugh N. Ahmann. USAF Oral History Interview, File K239.0512-1716, AFHRA, Maxwell AFB.

_____. Interview by Samuel E. Riddlebarger. USAF Oral History Interview, File K239.0512-249, 5 May 1970, AFHRA, Maxwell AFB.

Bonwit, B. L. USAF Oral History Interview, File K239.0512-064, Reel 1, AFHRA, Maxwell AFB.

Galuzzi, Jim. Interview by Author. April 12, 2001.

Gorski, Frank L. Interview by V. H. Gallacher and Lyn R. Officer. USAF Oral History Interview, File K239.0512-650, AFHRA, Maxwell AFB.

Kittinger, Joseph W. Interview by Robert B. Zimmerman. USAF Oral History Interview, File K 239.0512-807, AFHRA, Maxwell AFB.

_____. E-mail to Author. April 12, 2001.

Langford, Walter. E-mail to Author. April 12, 2001.

Marschalk, Paul. E-mail to Author. April 12, 2001.

Matthews, George. Interview by Author. April 11, 2001.

Schmidt, Nolan W. E-mail to Author. April 11, 2001.

Wickstrom, Tom. Interview by Author. March 30, 2001.

Official Reports/Manuals:

Aderholt, Harry C. *End of Tour Report, Commander 56th Air Commando Wing*. File K717.13, Dec 1966-Nov 1967, AFHRA, Maxwell AFB.

AFLC Tactics Manual, A-26A. File K200.8633-1, Nov 1968, AFHRA, Maxwell AFB.

Aircrew Weapons Delivery Manual, USAF Series A-26A Aircraft. File K168.92-11, 1 Aug 1969, AFHRA, Maxwell AFB.

Analysis of the Use of Propeller Vs Jet Aircraft in Laos. OASD/SA/SEA Programs Div. File K143.5072-86, Jan-Oct 1967, AFHRA, Maxwell AFB.

Comparative Analysis of Propeller Vs. Jet Aircraft. Directorate Combat Analysis, Headquarters, 7th Air Force. File K143.5072-86, Jan-Oct 1967, AFHRA, Maxwell AFB.

Relative Efficiency of F-4, A-1, and A-26 Aircraft Attacking Trucks in Laos. OASD/SA and AFXDC. File K143.042-31, 9 Oct 69, AFHRA, Maxwell AFB.

Simons, John. *Low-Altitude Reconnaissance/Strike Techniques, Problems.* File K-WG-56-SU-RE, 8 Jul 1967, AFHRA, Maxwell AFB.

Messages and Memorandums:

Bell, Jim. Letter to Denny Lynch, March 18, 1988.

CINCPACAF. Message to 13th Air Force, May 31, 1966. File K717.312-64, AFHRA, Maxwell AFB.

7th Air Force. Message to CINCPACAF, November 8, 1966. File K717.0413-15, AFHRA, Maxwell AFB.

Wollner, R. P. Chief Standardization Group- Headquarters Air Force, Memorandum, March 29, 1965. File K205.0604-2 V.2, AFHRA, Maxwell AFB.

Secondary Sources-

Ballard, Jack S. *Development and Employment of Fixed Wing Gunships, 1962-1972.* Washington: Office of Air Force History, 1982.

Chinnery, Philip D. *Any Time, Any Place, Fifty Years of the USAF Air Commando and Special Operations Forces, 1944-1994.* Annapolis: Naval Institute Press, 1994.

Futrell, Robert F. *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1961-1984.* Volume II. Maxwell AFB: Air University Press, 1989.

_____. *The United States Air Force in Korea.* Washington: Office of Air Force History, 1983.

Gilster, Hermann L. *The Air War in Southeast Asia, Case Studies in Selected Campaigns.* Maxwell AFB: Air University Press, 1993.

Guilmartin, John F., Jr. *Criteria for Evaluating Aircraft Combat Effectiveness: An Analytical Framework for Historical Analysis.* Columbus: unpublished manuscript, 2001.

Haas, Michael E. *Apollo's Warriors, United States Air Force Special Operations During the Cold War.* Maxwell AFB: Air University Press, 1997.

- _____, and Dale K. Robinson. *Air Commando! 1950-1975: Twenty-five Years at the Tip of the Spear*. File K317.04-4, Aug 94, AFHRA, Maxwell AFB.
- Hagedorn, Dan and Leif Hellstrom. *Foreign Invaders: The Douglas Invader in Foreign Military and US Clandestine Service*. Leicester: Midland Publishing, Ltd., 1994.
- Johnsen, Frederick A. *Douglas A-26 Invader*. Warbird Tech Series, Volume 22. North Branch: Specialty Press, 1999.
- Kelly, Orr. *From a Dark Sky, The Story of US Air Force Special Operations*. Novato: Presidio, 1996.
- Momyer, William W. *Airpower in Three Wars*. Washington: Department of the Air Force, 1978.
- Mrozek, Donald J. *Air Power and the Ground War in Vietnam*. Washington: Pergamon-Brassey's International Defense Publishers, Inc., 1989.
- Porter, Melvin F. *Night Interdiction in Southeast Asia*. HQ PACAF, Project CHECO. File K717.0413-93A, 9 Sep 66, AFHRA, Maxwell AFB.
- Robbins, Christopher. *The Ravens, The Men Who Flew in America's Secret War in Laos*. New York: Crown Publishers, Inc., 1987.
- Thorndale, C. William. *Interdiction in Southeast Asia, November 1966-October 1968*. HQ PACAF, Project CHECO. File K717.0414-11, Nov 66-Oct 68, AFHRA, Maxwell AFB.
- Tilford, Earl H., Jr. *Setup, What the Air Force Did in Vietnam and Why*. Maxwell AFB: Air University Press, 1991.
- Trest, Warren A. *Air Commando One, Heinie Aderholt and America's Secret Air Wars*. Washington: Smithsonian Institution Press, 2000.
- _____. *Lucky Tiger Combat Operations*. HQ PACAF, Project CHECO. File K717.0413-15, 15 Jan 67, AFHRA, Maxwell AFB.
- Van Staaveren, Jacob. *Interdiction in Southern Laos, 1960-1968*. Washington: Center for Air Force History, 1993.
- Watts, Barry D. *Unreported History and Unit Effectiveness*. unpublished manuscript.

Wickstrom, Tom. "A-26s, The Rest of the Story." *Air Commando Association Newsletter*, September 1988. 12-13.

_____. "Nimrods, Truck Killers on the Trail." *Air Commando Association Newsletter*, July 1988. 1,8-13.